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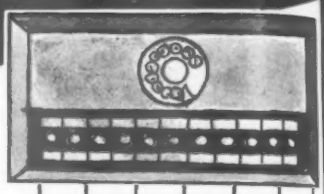

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The Truck Acts

At a meeting of the National Joint Advisory Council of the Ministry of Labour and National Service, under the chairmanship of the Minister, Mr. Iain Macleod, consideration was given to the amending of the Truck Acts, the first of which came into force in 1831. At that time, the owners of factories were a law unto themselves, and some insisted that the workpeople buy their groceries at a shop served by the works. Earlier, some concerns, such as those owned by the great Wilkinson, issued their own coinage (and those tokens are nowadays much esteemed by collectors). Industry is now quite changed, and we share the view that new legislation is needed.

Wage-stealing bandits have become an increasing menace and there is a desire by many firms to pay wages by cheque. At the moment, it is probably against the law to do so, yet some County Councils have for some years been paying their weekly wage-earners, including those entering into the category of "manual," by this means. Local shopkeepers often have arrangements to accept these cheques and everybody seems happy. Under the new proposals, it is recognized—though we fail to appreciate the situation—that there are cases (for example, during sickness) where payment through a bank would involve hardship, and here the suggestion is made that a postal order or a money order should be sent without needing the recipient's prior consent.

The Council accepted the Minister's proposals that: (1) Any person employed under a contract of employment may, if he so requests, and the employer agrees, have his wages paid directly into his banking account; (2) the worker's request for payment of wages into his banking account shall be made in writing not less than a week before the first pay-day on which payment is to be made in the manner requested; (3) where a worker is absent from his usual pay station owing to sickness or for reasons connected with his work, his wages may be paid by postal order or money order. (It is also for consideration whether payment may be made in this way in other cases at the request of the worker); and (4) where a worker himself requests, and the employer agrees, that payment should be made by cheque, provision should be made for this. The Council emphasized the importance of including in any legislation the right of the workman to have his wages paid in cash. We suppose this caters for the man who does not wish his wife to know the extent of his earnings, a type of employee whom we believe is rapidly disappearing.

European Foundry Apprentice Competition

The next European Foundry Apprentice Competition is to take place in Britain in May, 1960. It will be the third to be held to decide which of three young men, chosen from each of a number of Western European countries and not more than 20 years old, is the best foundry apprentice, and which nation has the best team of young foundry workers. The practical tests call for the making from start to finish of a casting; candidates have also to sit for written papers. Judging is by an international panel of expert foundrymen.

In previous competitions, held in Germany in 1957 and France in 1958, British placings so far have been third in the team events in both years. Last year one of the British entrants climbed to third place in the individual tests. A committee representing the separate national organizations of iron, steel and non-ferrous founders is making the arrangements. The secretariat is provided by the Council of Ironfoundry Associations. Countries eligible to enter apprentices are those in membership of the European Committee of Foundry Associations—Austria, Belgium, Britain, Denmark, France, Federal Germany, Holland, Italy, Luxembourg, Spain and Switzerland. Prizes for the 1958 winners (France) included free winter sports holidays provided by the French Government.

Dinner

INSTITUTE OF VITREOUS ENAMELLERS

At the Connaught Rooms in London, last Friday, members and guests of the southern section of the Institute of Vitreous Enamellers were welcomed to the annual dinner and social evening by the section president, Dr. B. K. Niklewski, a director of Main Enamel Manufacturing Company, Limited. The attendance of 58 was an increase on that of last year, and Dr. Niklewski, in congratulating those responsible, expressed the section's thanks, particularly to Mr. L. E. Turner, secretary, for his excellent organization of the function. At the high table the president was supported by Mr. C. P. Stokes, section chairman-elect (of Ferramic Industries, Limited).

Iron and Steel Institute's Special Meeting

A special meeting of the Iron and Steel Institute is being held on the north-east coast from Monday, July 6, to Friday, July 10. There are to be no technical sessions as the meeting is confined to works visits and social events in which ladies are asked to participate. Details of this attractive meeting are available from the secretary of the Institute, 4, Grosvenor Gardens, London, S.W.1.

Latest Foundry Statistics

Copper-base Alloys: The February production of copper-base castings was, according to the *Bulletin* of the British Bureau of Non-Ferrous Metal Statistics, 5,911 tons. The total for the first two months of the year is 12,021 tons; for the similar period last year the output was 12,974 tons.

MR. G. H. HALL, chairman of the Walsall and District Foundry Trade Joint Recruitment and Training Committee, presided at the first annual meeting and dinner held in Walsall last week.

Diploma in Technology Courses

The number of students taking advance courses leading to the award of the new Diploma in Technology has increased more than two-and-a-half times during the past 18 months. In a foreword to the second report of the National Council for Technological Awards, Lord Hives, chairman of the Council, says that 2,518 students are now following 66 courses leading to the diploma at 20 colleges as compared with 965 students following 37 courses at 11 colleges in November, 1957. In paying his tribute to industry, Lord Hives refers to the fact that 82 per cent. of students following sandwich courses have their fees paid by their employers.

Since the Council was set up by the Minister of Education just over three years ago, the first Dip.Tech's have been awarded and shortly several hundred diplomats will be taking their place in industry.

Residential facilities for students are an important factor, and the report states that a number of well-equipped buildings are being planned and constructed. So far the absence of these facilities has not prevented courses being recognized by the Council, but they point out that when renewals of recognition are considered they will expect to see "at least firm plans for the provision of hostels at those colleges where there is a substantial number of students attending courses leading to the Diploma in Technology.

Although the colleges must take the action necessary to ensure that the standard of industrial training matches that of the academic study, the Council themselves must also be satisfied that each student following a course leading to the Diploma is undergoing properly planned industrial training. The nucleus of an industrial training panel is now considering how best this end might be achieved in collaboration with the colleges.

The report says that colleges are active in developing liberal studies in a wide variety of ways. Many colleges now provide a basic course in English and social studies leading to an introductory study of industrial administration. Courses include such topics as economic history and geography; the impact of modern scientific thought on philosophy, psychology, literature, art and music; the history and philosophy of science; the æsthetics of engineering design; industrial relations; the economic aspects of industry; and industrial law. All schemes give particular emphasis to written and spoken English and a considerable number to English literature as well.

Last November the Council outlined their plans for an award higher than a Diploma in Technology which would lead to admission to membership to the College of Technologists. This scheme is now well advanced, and details will be announced as soon as possible.

WEST BROMWICH YOUTH EMPLOYMENT SUB-COMMITEEE is to set up two sub-committees to explore the possibilities of the recruitment and training of young people in the spring-making and foundry industries. Foundries and spring works predominate at West Bromwich, and it is thought that these industries would be likely to recruit a fair number of boys leaving school and offer them a future. Mr. E. J. Bate, youth employment officer, reported that 300 school-leavers at Easter had been placed with less difficulty than anticipated, partly because fewer boys had sought apprenticeships. The position in July was likely to be more difficult, the main cause appearing to be a shortage of apprenticeships.

Marine and Power Engineers meet in the United States

*By F. Hudson, F.I.M.**

The first International Meeting of Marine and Power Engineers[1], jointly arranged by International Nickel Company, Incorporated, and Mond Nickel Company, Limited, at Wrightsville Beach, North Carolina, USA, is reviewed in this article. Following visits to: the Bayonne Laboratory of the International Nickel Company; Brooklyn Navy Yard; Bethlehem Shipbuilding Company; Philadelphia Navy Yard; Philadelphia Brass and Bronze Company, and Newport News Shipbuilding Company, the European party at the meeting joined some 130 American and Canadian delegates at Wrightsville Beach to discuss the many corrosion problems that arise to-day in marine engineering. First, the delegates' tour of the corrosion-testing stations at Harbour Island and Kure Beach is described. Seven informal, but extremely interesting, sessions were then held, dealing with such subjects as the effects of galvanic and stray-current corrosion, cavitation erosion and impingement attack, and modern methods for overcoming these effects on hulls, evaporators, condensers, pumps, propellers, power units, etc. Non-ferrous castings play an important part in this field and the second part of this report outlines some of the major matters of interest which arose during the meeting and tour.

Corrosion-testing Stations

Inco's comprehensive corrosion-testing programmes are conducted at two locations near Wilmington, North Carolina. All sea-water testing and research is done at the main laboratory on Harbour Island (shown in Fig. 1), which is situated east of Wilmington between the mainland and Wrightsville Beach. Virtually all of the atmospheric-exposure tests are conducted about 18 miles further south at Kure Beach. Studies are being conducted on all types of materials including metals and alloys, metallic and organic coatings, fabrics, plastics, cordage, paper and woods. The conditions of testing are numerous and are designed to provide means for studying, in natural sea water, such effects on corrosion as flow rates, fouling, cathodic protection, galvanic coupling of dissimilar metals, and tidal changes. In the tests in ordinary atmosphere, the effects of such factors as proximity to the beach and surf, partial shelter, elevation, and splash from wave action are also being investigated.

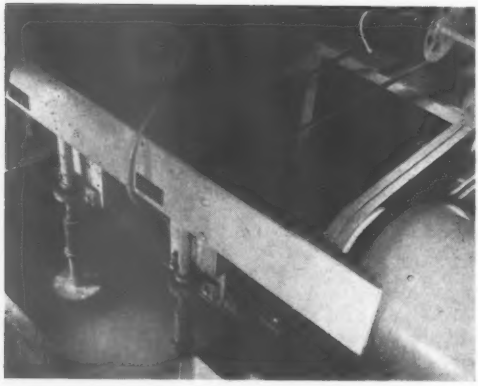
Rotating-spindle Machines

Specimens of various size and form are employed to meet particular test conditions. For example, in studying the effects of corrosion on marine propellers and pump impellers, rotating spindle machines (shown in Fig. 2) provide a means of conducting innumerable investigations on metal discs spinning at different speeds in sea water. Equipment such as this has been used to study the effect of alloy composition on the corrosion and erosion of cast nickel-aluminium bronze. In studying velocity effects on corrosion by sea water, use is also made of EES machines (in which specimens 4 by ¼ by ¼ in. are attached to the periphery of rotating discs), and the BNFMRA jet-impingement apparatus. Materials are tested in as many ways as possible, and models, as well as full-size equipment, are used.

FIG. 1.—*Aerial view of International Nickel Company's corrosion-testing station at Harbour Island, North Carolina, USA.*

(Courtesy, International Nickel Company, Incorporated.)

* The author is attached to the development and research department, The Mond Nickel Company, Limited, London.



(*Courtesy, International Nickel Company, Incorporated.*)

FIG. 2.—*Rotating-spindle machines for corrosion testing at Harbour Island.*

Sea-water Pumps

It is interesting to note that the battery of pumps illustrated in Fig. 3, which supply sea water to test units, are also employed to investigate the effects of corrosion, under actual service conditions, on materials used for casings, impellers and sealing rings. These pumps normally handle about 9,000,000 gall. of sea water per day. During recent years the programme at Harbour Island has also included the testing of full-scale equipment such as evaporators, distilling units, and condensers. A destroyer condenser, assembled for full-scale test for the US Navy, which requires 64,000 gall. of sea water per min., is illustrated in Fig. 4. Piping materials, ranging from 1¼ to 4 in. dia., are also under investigation. Sea-water flow is continuous, and is controlled and maintained at predetermined flow-rates by means of a number of valves (which are also under test) and orifice flow-meters located at strategic positions throughout the systems.

Special Booklet Available

In a report of this nature it is impossible to detail all the extensive corrosion facilities available at Harbour Island and Kure Beach, and the useful work being done, and for further information reference should be made to the special booklet[2] on the subject. Between 1,500 and 2,000 engineers and technicians visit the station annually, and through the years nearly 13,000 experiments have been carried out involving about 240,000 specimens. Data from these tests are available for reference in answering inquiries received from all over the world.

Corrosion-proof Cruiser

The latest acquisition by the test stations is a Roamer express cruiser called Platanode, claimed to be the most corrosion-proof vessel afloat. This craft has a steel hull, and corrosion is prevented by applying a controlled electric current to neutralize that generated by corrosion action. A similar system is installed on the new aircraft carrier Independence and the nuclear-powered submarine Triton, as well as on other large US Navy and merchant ships. The Platanode will be used as a floating laboratory for further studies in this field.

SIXTIETH ANNUAL MEETING OF MARINE AND POWER ENGINEERS

Although the main theme throughout the meeting primarily dealt with the subject of corrosion the agenda also wisely covered related production methods, such as method of manufacture, effect of welding, etc., on non-ferrous castings used in the marine and power fields. In this connection matters of most interest were undoubtedly those dealing with the mechanism of erosion damage, microstructure of cast high-tensile aluminium-bronze, and the manufacture and repair of aluminium-bronze marine propellers.

Erosion Damage

Erosion damage cannot be ascribed to any one cause, but is due to a number of contributory factors. Furthermore, the widely accepted view that this type of damage is primarily due to the effects of mechanical action, caused by water hammer arising from the collapse of vortices, cannot always be substantiated. In this latter connection the writer drew the attention of the meeting to the recent paper by Callis[3] on this subject, in which it is suggested that it is not the collapse of cavitation-voids which causes the damage, but an action basic-

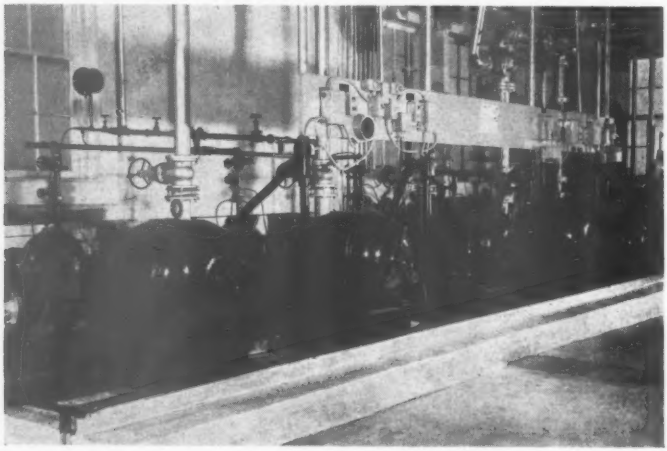


FIG. 3.—*Pumps supplying sea water to test units.*

(*Courtesy, International Nickel Company, Incorporated.*)

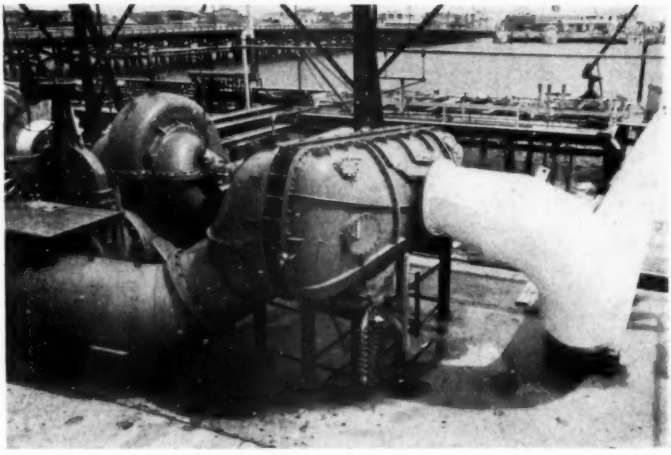


FIG. 4.—*Destroyer condenser assembled for full-scale test for US Navy.*

(Courtesy, International Nickel Company, Incorporated.)

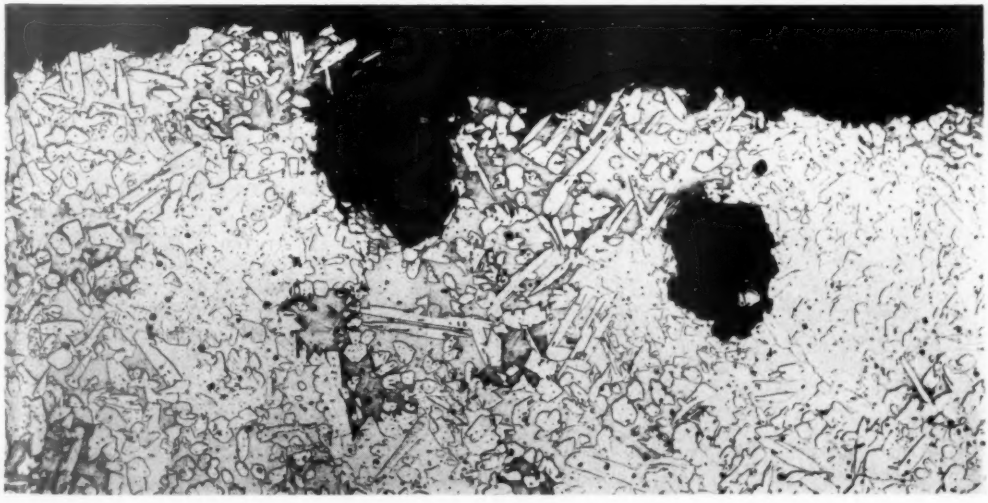
ally identical with that of impingement attack with turbulence of the liquid as the major factor. Several slides were shown to support this theory, including the photo-micrograph illustrated in Fig. 5, which shows the structure of a section cut from an eroded area on a high-tensile-brass marine propeller. The absence of any indication of distortion, and the tendency of the soft alpha phase to stand out from the beta matrix, should be noted. Furthermore, these surface characteristics are to be seen on the most slender projections in the most severely-eroded area, and all these features are suggestive of a process of corrosion, and not of a mechanical battering by high-velocity slugs of water.

Mechanical Action is sometimes associated with Erosion Damage

Evidence that mechanical action can in some cases be associated with erosion damage, although this may not be apparent from the appearance of the metal structure in the eroded area, was demonstrated by Vanick, as will be observed from Figs. 6 and 7. Fig. 6 shows the micro-structure of a section taken from the eroded area of a small high-tensile-brass propeller, together with a hardness survey. It will be noted that there is considerable work-hardening of the metal adjacent to the eroded surface. As a further test for indicating the degree of work-hardening present a similar section to that shown in Fig. 6 was heated at 593 deg. C. (1,100 deg. F.) for 30 min., and it was found that recrystallization of the metal in the eroded area had taken place, as indicated in Fig. 7. Check tests were conducted on other areas to confirm that grinding operations in finishing the propeller did not induce enough cold work to cause the recrystallization observed.

FIG. 5.—*Section through an area of cavitation erosion on a high-tensile brass marine propeller* (×40).

(Courtesy, G. T. Callis.)



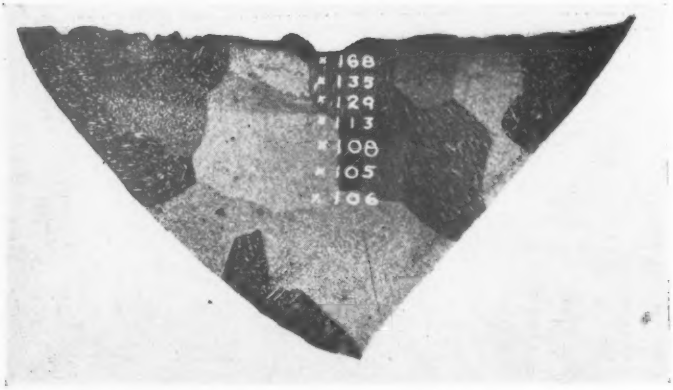


FIG. 6.—*Section through cavitated area on small propeller, showing original structure and hardness survey in V.H.N. (1-kg. load)* (×6).

Cast High-tensile Aluminium-bronze

Very little reliable information is available on the composition of the structural constituents in high-tensile aluminium-bronze, and the development and research department of International Nickel Company Incorporated have a research project relative to this subject. Investigations indicate that the composition of the "kappa" phase, for example, would appear to be as follows:—Fe, 44.0; Ni, 26.5; Al, 15.0; Cu, 12.5; and Mn 1.0 per cent. So very often it is assumed that iron does not alloy to any appreciable extent in copper-base alloys, and the result of this work when completed will undoubtedly be of great value.

Manufacture and Repair of Aluminium-bronze Propellers

The use of cast nickel-aluminium bronze (4 to 6 per cent. nickel) for marine propellers is steadily increasing in the USA and Canada, and such propellers have been fitted to a large number of naval and merchant vessels, including the nuclear-powered submarines Nautilus and Sea Wolf. Material-specification requirements for cast high-tensile aluminium-bronze propellers are less stringent than in the UK, and US specification Mil.-B-21230 (Ships) only calls for mechanical properties of not less than:—85,000 lb. (38 tons) per sq. in. ultimate tensile strength; 35,000 lb. (15.6 tons) per sq. in. yield, and 15 per cent. elongation. Furthermore it is still the custom of inspection authorities to demand "cast-on" test-bars, and the range of properties obtained on a production basis by one of the large propeller foundries visited were as shown in Table 1.

TABLE 1.—*Properties Obtained from Test-bars for Aluminium-bronze Propellers.*

Composition (per cent.). Al 8.80–9.15, Ni 4.50–4.75, Fe 3.90–4.10, Mn 0.35–0.60.	Test-bar attached to propeller.	Separately-cast test-bars.	
		Drysand mould.	Chill mould.
Ultimate tensile strength (tons per sq. in.)	38.0–40.0	39.3–41.7	43.3–45.5
Yield point (tons per sq. in.)..	17.8–20.0	17.0–18.7	20.0–22.3
Elongation per cent. on 2 in...	24.5–33.5	20.5–32.5	16.5–24.5

Melting Practice for Propellers

Melting is invariably conducted in large oil-fired reverberatory furnaces. Oxygen-enriched blast is widely employed, and this results in a melting rate of approximately 3.0 to 3.5 tons per hr., which is considerably faster than that obtained from British furnaces of similar type and size. The oxygen is introduced into the air blast at a pressure of 15 to 20 lb. per sq. in. and about 3,100 cub. ft. is consumed, over a melting period of 5½ hr., for a furnace charge of 16½ tons composed of pre-alloyed pig and foundry scrap from previous melts. Magnesium is often used as a deoxidant (2 oz. per 100 lb. metal), and this is added when the melt is at about 1,204 deg. C. Tapping temperatures vary, according to the size and weight of the propeller being cast, between 1,180 to 1,260 deg. C. Degasification is generally conducted in the ladle during tapping of the furnace, by scavenging with dry nitrogen (0.25 cub. ft. per 100 lb. metal at 15 to 20 lb. per sq. in. gauge pressure). Pouring temperatures for large high-tensile aluminium-bronze propellers range from 1,120 to 1,175 deg. C.

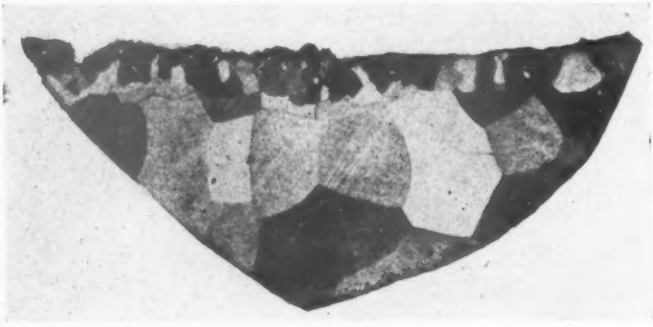


FIG. 7.—*Similar view to Fig.* 10 *after heating at* 593 *deg. C.* (1,100 *deg. F.*) *for* 30 *min. Recrystallization has occurred in work-hardened zone.*

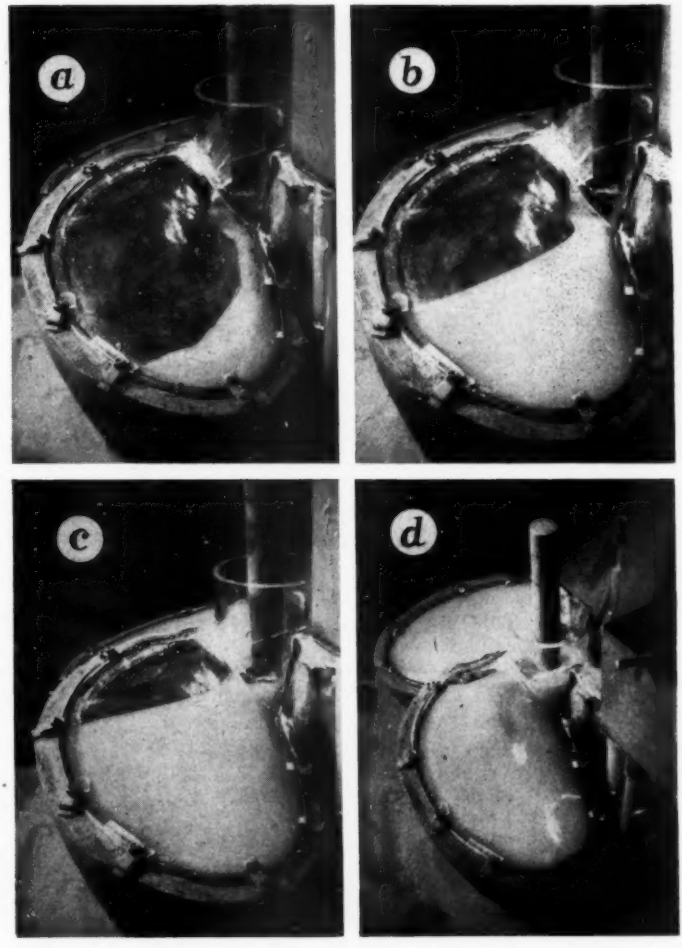


FIG. 8.—*Pattern of metal flow in running a propeller mould. When a propeller is run from the bottom of the boss, using suitable choked-ingates, non-turbulent unidirectional flow can readily be obtained. The metal slowly flows through each blade, like the opening of a fan, and any dross is swept ahead into the feeding head.*

Production of Pre-alloyed Pig

As is customary in Britain, propeller manufacturers in the USA produce their own pre-alloyed pig. At one works visited this was done in two stages. Stage 1 consisted of melting electrolytic copper (470 lb.), 30 per cent. manganese-copper (11 lb.) and pure aluminium (29 lb.), in large oil-fired crucible furnaces to give an alloy containing about 5.70 per cent. Al., 0.65 per cent. Mn., remainder Cu. Stage 2 entailed making the hardener alloy, containing pure nickel (31 lb.), pure iron (27 lb.), pure aluminium (29 lb.), electrolytic copper (53 lb.), to produce an alloy containing 22 per cent. Ni., 20 per cent. Al., 20 per cent. Fe., remainder Cu. This hardener is made in a high-frequency coreless induction furnace. The molten stage-2 alloy is now added to the molten stage-1 alloy and the melt thoroughly stirred, superheated to 1,260 deg. C., and then cast into ingots.

Moulding Practice for Propellers

Moulding methods in the American propeller foundries visited did not appear to be so up to date as those in Britain. Very few cement moulds were seen and dry-sand appeared to be the moulding material most widely used, in conjunction with wooden pattern equipment forming a complete single blade and part of the boss.

Running and Feeding

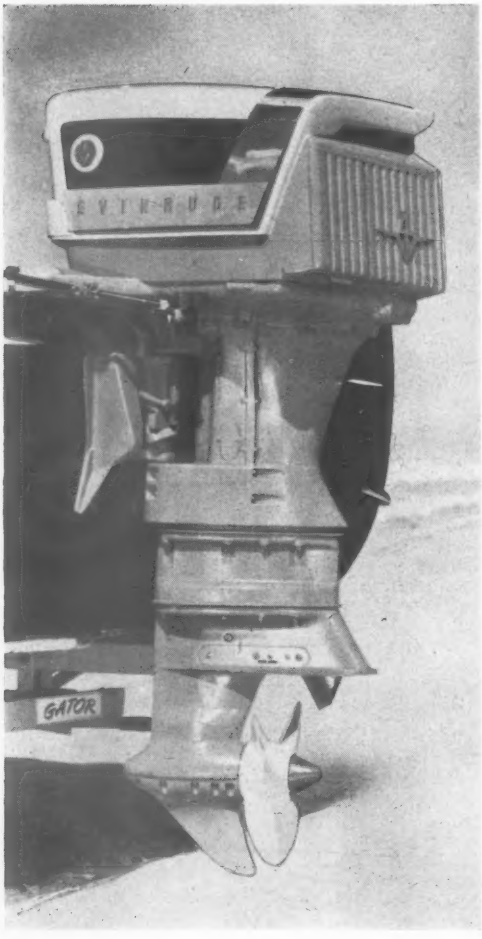
Running and feeding methods[4] were similar to those employed in Great Britain, namely, the use of choked-ingates at the bottom of the boss in conjunction with a large feeding-head on top of the boss. Experiments conducted with model moulds made from perspex, using coloured water as the liquid medium, show that this method of running large propellers is capable of giving excellent results so far as the ideal pattern of flow for aluminium-bronze is concerned. A short film, made in co-operation with Société Nantaises, Nante, France (based on the use of perspex moulds), showing the pattern of flow which can be expected when running a propeller casting, was shown by the author to delegates attending the meeting of Marine and Power Engineers. This was received with very great interest and some of the frames from this film are reproduced in Fig. 8.

Propeller Repair

A great deal of useful information on the repair of high-tensile aluminium-bronze propellers was given to the European delegates by J. L. Cahill on their visit to the New York Naval Shipyard at Brooklyn.

Hot-straightening

Hot-straightening is not possible unless a



(*Courtesy, Outboard Marine Corporation.*)

FIG. 9.—*Evinrude Starflite Vee-4 two-cycle 50-h.p. outboard motor. Non-ferrous castings form an important part of these engines.*

temperature of at least 1,400 deg. F. (760 deg. C.) is reached and maintained. The following heating cycle is recommended for the repair of large propellers:—

(1) Heat with propane torches for a period of not less than 3 hr.

(2) Heat pattern should be applied over a large area of the blade and not only in the area to be straightened. The heated zone should preferably extend about 1 to 1½ ft. wide, and temperature gradient from this zone towards hub and tip should fall off gradually. There should be no abrupt temperature gradient.

(3) If necessary oxy-acetylene torches should be used to implement heating.

(4) The idea is to get a large section of the blade relatively hot before attempting to straighten. This means a soaking heat of 1,400 deg. F. (760 deg. C.), and not just a surface temperature of this magnitude.

(5) Straightening should be accomplished gently, in easy stages, using proper equipment such as propeller stands, bending irons, pad plates, screw jacks, appropriate gauges, etc. When the temperature in the zone being straightened falls below 1,400 deg. F. (760 deg. C.), reheat as above.

(6) After straightening, allow blade to cool slowly under asbestos blanket.

Welding

For welding aluminium-bronze propellers the inert-gas metallic-arc process is preferred, using a stranded filler wire known as Airco A-101. Little or no preheat is employed. Approximate operating conditions are 45 cub. ft. per hr. of argon, 26-27 v., 265-275 A., with a wire feed of 190 in. per min. The approximate deposition rate at 100-per cent. operation is 11.7 lb. per hr. (For further information see paper on this subject by Cahill[5].)

Weld-cracking: Difficulty is still being experienced from weld-cracking when nickel-aluminium bronze welding-wire is employed, and the author suggests that this may be due to the presence of impurities such as lead and bismuth. Excellent results have been obtained from Superston-40[6] electrodes. No difficulty has been experienced from weld-cracking, and test-pieces cut from the weld have given a tensile strength of 41.5 tons per sq. in. with 25.5 per cent. elongation. The only disadvantage arising from the use of Superston-40 electrodes is that the weld metal does not colour-match with ordinary high-tensile aluminium-bronze castings.

General Foundry Matters

Cupro-nickel Castings

The excellent service life obtained from 90/10 wrought cupro-nickel in marine and power installations has led to the development of casting alloys[7] of similar type. Two compositions are put forward:—

(1) A 12-per cent. nickel/copper alloy, containing 1.0 per cent. manganese and 1.2 per cent. iron, having a tensile strength of 20 tons per sq. in.

(2) A 12-per cent. nickel/copper alloy, containing 1.5 per cent. aluminium, 1.0 per cent. manganese and 0.6 per cent. iron, having a tensile strength of 42 tons per sq. in.

The lower-strength alloy mentioned above is readily weldable, using Inco No. 137 electrodes, and it can be directly welded to steel with Inco No. 140 electrodes. All types of castings, from small pipe-fittings weighing a few ounces to pump bodies of 1½ tons, have been successfully produced and it is replacing tin-bronze and gunmetal castings where brazing or welding is required. However, it must be kept free from lead and phosphorus if weld-cracking is to be avoided.

The high-strength alloy, containing 1.5 per cent. aluminium, is more difficult to handle in the foundry, particularly so far as the production of pressure-tight castings are concerned. This alloy can also be welded with Inco No. 137 electrodes, in sections up to ½-in. thick, but so far no actual tests have been conducted on the welding of heavier sections.

Petro-bond Sand-binder

Several non-ferrous foundries in the USA are now using this new sand-binder[8] on a production basis, and it appears to be giving excellent results in the founding of copper- and aluminium-alloy castings of light- to medium-section. The basis of Petro-bond is a clay which has been treated in such a way as to develop its bond with a petroleum-base oil rather than with water. The author had the opportunity of visiting one foundry using this new binder. The finish and dimensional accuracy of the castings was excellent and equal to that obtained by shell-moulding methods. Whilst the bonding materials are expensive, they cost less than those used in shell-moulding, and the sand has the advantage of being readily reclaimed. Where castings are subjected to hand-polishing operations the use of oil-benton sand has resulted in substantial saving in polishing costs, amounting to 14 times the additional foundry costs involved.

Dressing-shop Methods

Many foundries have gone over to the use of abrasive-belt machines, instead of grinding machines, for finishing copper-base-alloy castings. Large abrasive cutting-off machines, of the swing-frame type, are also extensively employed for cutting-off heavy-sectioned runners and risers. Machines of this latter type are still not available in Great Britain, although the advantages arising from their use were clearly indicated in the British Brassfoundry Productivity Team Report published in 1950.

Acknowledgments

In view of the interest created by this visit to the USA it is hoped that visits of a similar nature will be held from time to time in the future. All of the European delegates who participated in this first International Meeting of Marine and Power Engineers are indebted to the International Nickel Company Incorporated, New York, for arranging such an interesting and useful programme, and in particular to Frank L. LaQue, Jim Vanick, Gerry Lee, and George Geiger for the delightful way they arranged the trip. The delegates are proud to have become members of the Sea Horse Institute.

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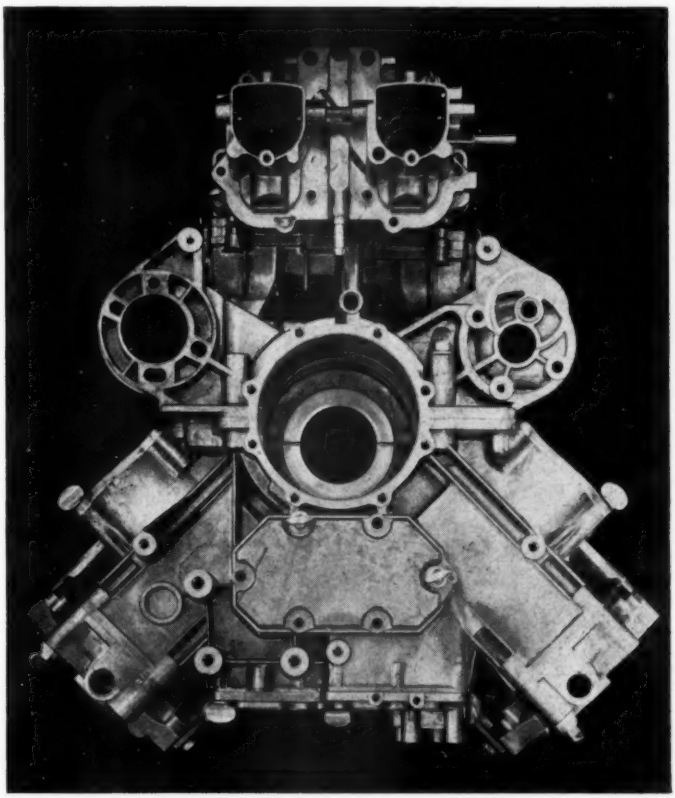
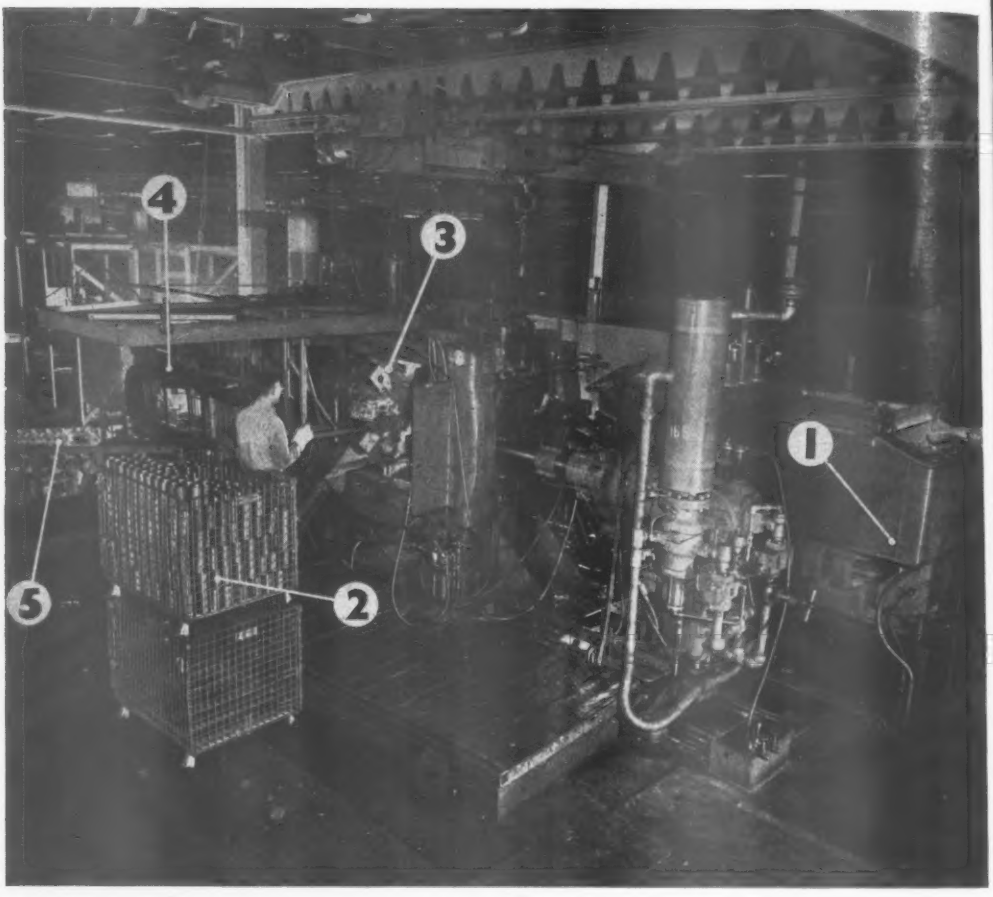
Fifth Annual Meeting of Naval Architects and Small-boat Builders

Prior to the International Meeting of Marine and Power Engineers, the writer participated in



(*Courtesy, Outboard Marine Corporation and* Foundry.)

FIG. 10.—*Die-cast aluminium-silicon* (10 *to* 12 *per cent.*) *-alloy cylinder block for the outboard motor shown in Fig.* 9. *Cast-iron sleeves and a bronze half-bushing are all cast in place.*



(*Courtesy, Outboard Marine Corporation and* Foundry.)

FIG. 11.—*Lay-out of die-casting machine and ancillary equipment for making aluminium-silicon-alloy cylinder block. 1. Holding-furnace and automatic ladling-unit. 2. Cast-iron cylinder sleeve inserts. 3. Removing casting from die. 4. Chute on which inserts are loaded. 5. Cooling-chute for castings, leading to trimming press.*

the fifth annual meeting of Naval Architects and Small Boat Builders (also held at Wrightsville Beach), and the chief matters of interest arising are dealt with in what follows.

In the small-boat field the Americans are ahead of the United Kingdom and Europe. There is a huge market in North and South America for pleasure craft and these are now being fitted with very large outboard-motors (see Fig. 9), developing up to 70 h.p., and giving speeds of 45 to 50 m.p.h. Non-ferrous castings form an important part of these engines.

Main Parts are Die-cast

A one-piece aluminium-silicon-alloy die-casting (see Fig. 10) forms the cylinder block, intake manifolds, and upper crankcase. Cast-iron cylinder sleeves and a bronze half-bushing are all cast in place. As cast, including inserts and runners, the block weighs 37 lb., and the die about 6½ tons. The lay-out of the die-casting machine and ancillary equipment used is shown in Fig. 11 and a full description of this plant has been recently outlined by J. C. Miske[1]. Metal is initially melted in a 200-kw. induction furnace. This furnace tilts hydraulically into a second one, which functions as both a holding furnace and an automatic ladling unit. All metal is usually secondary ingot, and a Quantometer check on analysis is made once per shift. This pioneering operation at Outboard Marine Corporation is extremely interesting in itself, but

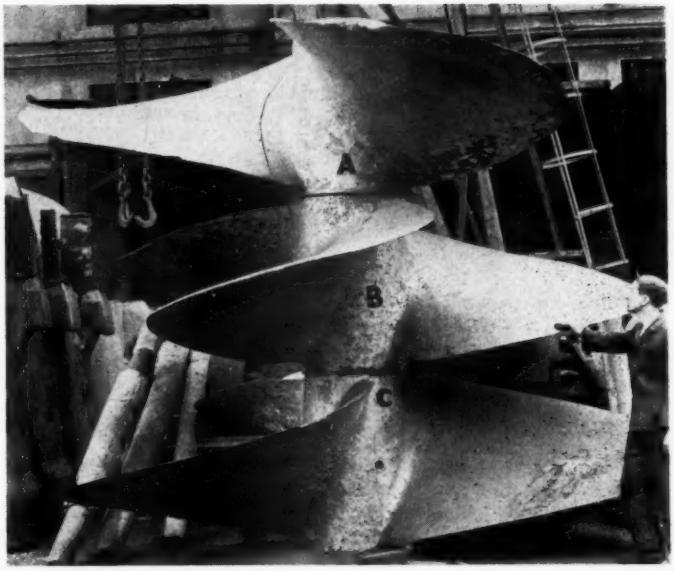


FIG. 12.—*Large cast-Monel propellers fitted to the Argentine battleship Rivadavia in 1912. Each propeller is 15½ ft. in dia. and weighs just over 7 tons. One of the blades in propeller A has been given a light grind to show that corrosion is still only superficial.*

(*Courtesy, Ansaldo S.A.*)

no more so that the question of what it may portend for automotive engines. It is no secret that the automobile companies are actively investigating the possibilities of aluminium engines, although not necessarily in terms of die-castings.

Aluminium-bronze Propellers are Fitted

Propeller speeds and stresses on these large outboard motors are high, and in order to obtain maximum reliability and service life it is customary to fit cast high-tensile aluminium-bronze propellers. It is of interest to note that these large motors will shortly be manufactured in Great Britain.

Hydrofoils in Small Craft

The application of hydrofoils to ships' hulls is being studied by American marine engineers, and considerable work has already been done relative to their use on small craft. Hydrofoils are small fins fitted to the side of the hull and they act in a similar way to the flaps on an aircraft's wing. By varying the pitch of the hydrofoils, when the ship is travelling at speed, the hull can be raised out of the water so that it planes along the surface. This increases the speed of the ship enormously. From the discussions which arose at the meeting it is evident that the development of hydrofoils in the USA has now reached the stage where they can be effectively fitted to small craft of up to 100 tons in weight, enabling speeds of 80 to 100 m.p.h. to be achieved. Furthermore it is considered practicable to obtain speeds in this range from ships up to 3,000 tons by the proper use of hydrofoils.

Improved Materials

It was also evident that improved materials will have to be developed for propellers, "A" brackets, rudders, etc., for vessels of this type. At speeds above 50 knots, high-tensile aluminium-bronze propellers are seriously eroded, and better results have already obtained by coating them with neoprene. This, however, is not a permanent solution to the problem, as the adhesion of the neoprene to the base metal is not good enough, and there is a tendency for the coating to strip. Design is also an important factor in minimizing erosion damage, and a direct result of the work on hydrofoils has been the evolution of the "super-cavitating" propeller by the US Office of Naval Research. The usual type of marine propeller rapidly loses its efficiency when driven at high speed; the new design, however, develops its full potential at high rotational speeds. Regarding improved alloys for

TABLE 1.—*Properties of Cast Aluminium-Monel and Nickel-titanium-aluminium Alloys.*

Alloy.	Tons per sq. in.			Elongation.	Izod impact strength, ft.-lb.	Brinell hardness No.
	0.1 per cent. proof stress.	0.5 per cent. proof stress.	Ultimate tensile strength.			
Monel containing 3 per cent. Al:						
Separately-cast test-bars	—	—	53.9	26.0	55	287
Test-bars cut from propeller boss	—	32.0	51.3	17.0	—	314
Test-bars cut from blade root	—	34.5	58.5	17.0	—	302
Ni.-Ti.-Al. Alloys (All separately-cast test-bars.) *						
4 per cent. Ti, 2 5 per cent. Al (as cast)	22.8	26.2	47.2	34.0	120	242
" " (aged 20 hr. at 650 deg.C.)	34.4	36.2	55.6	32.0	106	308
6 per cent. Ti, 3.5 per cent. Al (as cast)	36.0	38.0	62.4	17.0	67	350
" " (aged 20 hr. at 650 deg. C.)	45.2	48.4	73.5	13.0	43	381

Marine and Power Engineers' Meeting

such service, the author drew the attention of the meeting to investigations conducted in Great Britain, in 1940, relative to cast aluminium-Monel and nickel-titanium-aluminium alloys. Alloys in both of these groups, as will be observed from Table 1, are capable of producing castings with properties considerably higher than those at present obtainable from high-tensile aluminium-bronze, and they have excellent resistance to corrosion and erosion by sea water.

Monel Propellers

Ordinary cast-Monel has been successfully employed in the past for the production of large marine propellers[2]. In 1912, several Monel propellers were made by the Bayonne Castings Company (now the Bayonne foundry of the International Nickel Company) for battleships being built in the USA at that time. In this connection the Argentine battleship Rivadavia was fitted with three Monel propellers, 15½ ft. in dia., each having a finished weight of just over 7 tons. In 1958, this ship was purchased by an Italian firm for breaking-up, and the appearance of the Monel propellers, after 40 years' immersion in sea water, can be observed from Fig. 12. After removal of dried marine growth, the underlying metal was found to be completely free from corrosion, and a light grinding operation was all that was required to restore original appearance. The composition of these castings was as follows—Si 0.83, Mn 2.71, Fe 2.50, Mg 0.10, C 0.25, and Cu 25.50 per cent., Ni remainder. Acceptance tests at the time of manufacture, based upon test-bars attached to the propeller blades, gave average mechanical properties of 37.1 tons per sq. in. ultimate tensile strength, 16.7 tons per sq. in. yield, and 41.0 per cent. elongation.

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TI gets Big Russian Order for Steel Tubes

In the face of keen international competition, the steel tube division of Tube Investments, Limited, has won a big Russian tube contract. The contract was negotiated with Promsyrioimport for the export of stainless and alloy-steel tubes. The value of the order, which is for delivery by the end of the year, is expected to exceed £2,000,000.

The President of the Board of Trade, Sir David Eccles, last week confirmed in the House of Commons that he would lead the British trade mission to Moscow next month. He will be accompanied by two or three leading businessmen, whom he is now choosing, as well as by four or five officials of the Board of Trade.

ONLY WORKING short time since the end of last year, the Tees foundry of Ashmore, Benson, Pease & Company, resumed full-time working this week. Nearly 100 men will benefit.

AEI Chairman Notes "Some Improvement" for 1959

Lord Chandos, chairman of Associated Electrical Industries, Limited, speaking at the annual meeting, disclosed that the Nuclear Energy Company, Limited, which is jointly owned by AEI and John Thompson, Limited, would incur substantial losses on its contract for the Berkeley nuclear power-station.

It was impossible at the time the contracts were entered into, he said, to assess the difficulties or modifications entailed by this "entirely new adventure into the unknown." But in common with the other three contracting groups, they had gained an amount of knowledge and experience probably unique and likely to prove of great, though unassessable, value in the future.

Lord Chandos criticized the Restrictive Trade Practices Act which, he said, was likely to lead to larger industrial units and would tend greatly to curtail collective price maintenance by manufacturers.

On the general position, orders booked by the company during the year were some 5 per cent. down at £167,000,000. The general volume of demand for mining equipment had not been as great in 1958, but AEI had maintained its pre-eminent position. The decline in orders booked had to be seen in relation to the previous year's figures which were £40,000,000 above the highest figures recorded up to that date.

Orders in hand, Lord Chandos reported, were £182,000,000. In spite of increased output, he said, they had not been able to reduce the figure by any significant amount. Current year trading for the first quarter showed "some, but not a very marked improvement" over 1958, but they looked to see improved trade in the latter part of this year.

Brown Bayley Steels' Order Intake

Referring to the subsidiary, Brown Bayley Steels, Limited, Mr. J. W. Garton, chairman of the parent company, Brown Bayley, Limited, states in his annual review that the year started with a good order-book, but the intake fell to such an extent that the outstanding order position at the present time was much below the company's capacity. It was extremely unlikely that the 1958 profits would be maintained this year, but the first few months of 1959 had shown a slight increase in the order intake.

The other subsidiary, the Hoffmann Manufacturing Company, Limited, had had a reasonably successful year, particularly in view of the fact that there had been a considerable contraction in the order position.

Net profit for Brown Bayley was £160,264 (£151,842) and the dividend is 1 per cent. higher at 11 per cent. The holding in Hoffmann Manufacturing remains at £2,130,000 with a market value of £4,200,000 (£2,460,000) and in Brown Bayley Steels at £766,275 having a market value of £833,887 (£585,975). Capital expenditure of £780,000 (£770,000) has been sanctioned and outstanding contracts placed against these sanctions total £328,000 (£47,000).

TO PROVIDE A QUICK LINK between its factories at Oxford, Swindon, Reading, Glasgow, and Swansea, the Pressed Steel Company, Limited, has invested in its own full-time "executive aeroplane," a de Havilland 104 Dove. The plane will serve to bring the Cowley and Swindon plants within two-and-a-half-hour door-to-door access of the works at Linwood, Paisley.

Metal Loose-pieces

By "Checker"

Loose-pieces for patterns and coreboxes should be avoided whenever possible, but there are sometimes instances where an irregularly-shaped casting necessitates the inclusion of a loose piece or pieces in the pattern equipment. This article deals with the advantages and disadvantages of using loose pieces made of metal instead of wood.

With wooden patterns and coreboxes, loose pieces soon show signs of wear if in constant use. This may result in incorrect positioning on the pattern, and the sharp edges and corners of the pieces become rounded, the protruding parts losing their true shape. Therefore, it is usually an advantage to use metal loose pieces whenever practicable. If these are cast in aluminium, they will give satisfaction for a considerable time before needing replacement, and furthermore are easily filed to shape and size where necessary—the result being a better-looking and more accurately-dimensioned casting.

Dovetail to hold Loose-piece

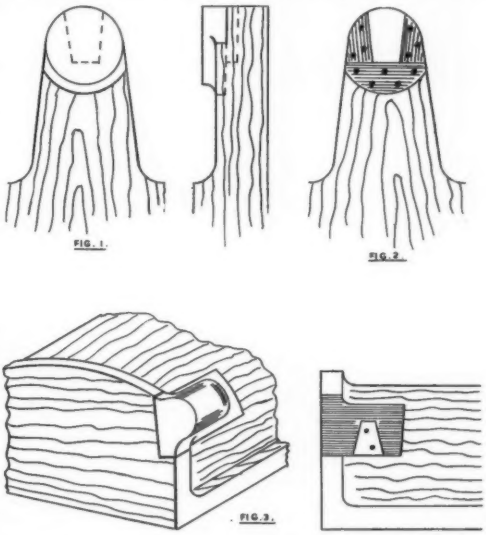
Fig. 1 shows the loose facing at the end of an arm, which is recessed back sufficiently to eliminate the feather edge of the fillet. A dovetail is desirable to hold this loose piece in place, and its position is shown by the dotted lines. This dovetail is cast as one integral part with the loose facing, with the dovetail edges cast square for moulding purposes. These tapered sides, which would have been undercut for moulding, are filed to shape afterwards.

Metal Facings

One of the disadvantages with metal loose pieces being used on wood patterns or coreboxes is the constant rubbing of the metal against the wood, with resultant wearing away of the wood. To overcome this, metal strips or facings should be let into the wood. If these are cut from $\frac{1}{8}$-in. thick brass, they will be found ideal for the purpose. Fig. 2 shows how the metal surface may be provided, using three pieces, as illustrated, to cover the surface against which the loose pieces will slide. The $\frac{1}{8}$-in. thickness of brass will give sufficient bearing for the dovetail sides to slide against.

Loose-piece to form Boss

The example shown in Fig. 3 is where a loose piece is required to form a boss which protrudes from the flange shape. On this loose piece, as in the previous example, the master pattern should be so constructed that only the minimum of time has to be spent making it the correct shape. Therefore, only a small machining or filing allowance should be left on the flat surfaces. The dovetail recess shape is cut away at the back of the master pattern and can be moulded to the exact shape desired. When making the actual dovetail it is an advantage to first fit it into the loose piece, and, when satisfactory for shape and size, to screw it into position. In most instances, it is preferable to make the dovetail and loose pieces of different metals—for instance, if the loose piece is of aluminium, then the dovetail could be made of either brass or mild steel.



FIGS. 1 TO 3.—(1) *Loose facing at the end of an arm, the loose piece being held in position by a dovetail (shown by dotted line);* (2) *three metal strips covering the surface against which the loose piece slides, and* (3) *a case where a loose piece is required to form a boss protruding from the flange shape.*

One Piece for Two Bosses

Fig. 4 shows a plan and section view of two bosses on a corebox side which have to be loose, and can in this instance be incorporated on one dovetail-shaped piece. The master pattern is made with a good taper each side, and sufficiently wide to include the boss fillets. To prevent the metal loose piece rubbing against the wood sides, suitable metal strips are screwed into position at the bottom

Metal Loose-pieces

and sides, whilst the back is recessed to permit two metal strips to be screwed into place level with the wood, as shown in Fig. 5. Sometimes it may be quicker and easier to cover the back of the dove-

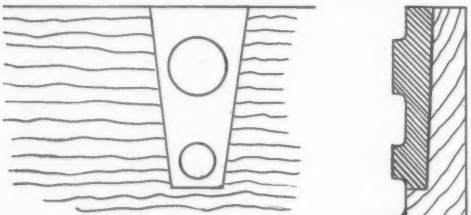


FIG. 4.

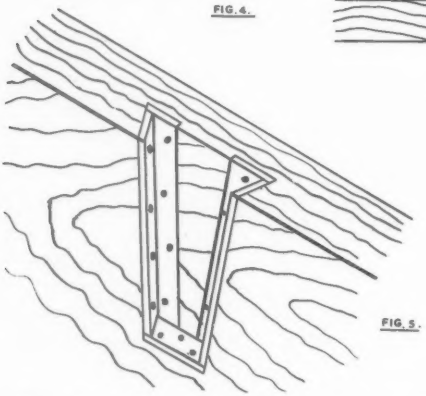


FIG. 5.

FIGS. 4 AND 5.—(4) *Plan, and section, views of two bosses which may be incorporated on one dove-tailed-shaped piece, and* (5) *two metal strips screwed into place level with the wood.*

tail recess completely with metal. Whenever possible, it is an advantage to complete the recess with the metal strips screwed into place, before finally fitting the loose metal piece into position.

Nuclear Marine-propulsion Agreement

An agreement signed by the Fairfield Shipbuilding & Engineering Company, Limited, and Mitchell Engineering, Limited, will enable the two companies to work together on the study and development of the use of nuclear energy for marine propulsion and in the design, manufacture, and sale of machinery using nuclear energy for the propulsion or auxiliary power of ships.

Mitchell Engineering has already gained experience in nuclear power plants for land generating stations and is allied with Combustion Engineering Inc., an American firm engaged on research, design, and manufacture in this field. The Fairfield company will contribute its knowledge and experience in the design and construction of ships and geared steam turbine installations.

Metallurgical Abstract

The Air Gap in Permanent-mould Casting. J. D. KELLER and N. R. ARANT. ("Blast Furnace and Steel Plant." 1958. Vol. 46; No. 9; pp. 957-65). In the chill casting of iron rolls, the depth of the hard shell is sharply limited (for any one composition and diameter) and the hardness obtainable falls below that which can be produced in thin sections. This is due chiefly to the formation of an air gap between the iron mould and the newly solidified surface of the casting. This study was carried out to determine, with reasonable accuracy, the width of the gap and its growth with time, in chill-casting rolls.

This was accomplished by analysis of the heat conduction and heat storage in the mould as well as the temperature changes in the roll casting. The temperature measurements were obtained in tests during solidification of three different sizes of actual production rolls of alloy-cast iron, by thermocouples embedded at various depths in the mould, and in the roll body. The rolls were Ni-hard, grain-type rolls (Total C 3.0 to 3.6; Ni, 4.00 to 4.75; Cr, 1.4 to 3.5; Si, 1.25; P, 0.40; S, 0.15; and Mn, 0.40 to 0.70 per cent.).

While the widths of air gap determined by this method depend on the correctness of the assumption that the thermal conductivity of the mixture of gases, which fills the gap, is practically the same as that of air, the important feature with regard to control of the casting properties is not the linear distance across the gap, but rather the corresponding heat transfer coefficients. These coefficients are not dependent on that assumption, and are believed to be accurate. The study of the growth of the air gap was confined to the first 15 min. after pouring, as the formation of the chilled shell had been completed within that time.

Further Big Order for British Railways

More orders for diesel locomotives and rolling stock for the railways modernization programme have been placed by the British Transport Commission. The orders, which are worth some £4,500,000, are for 37 main-line and nine shunting diesel locomotives, 27 three-car diesel multiple-unit trains, 12 kitchen cars, and 76 sleeping cars.

British Railways' locomotive works at Derby are to build the 37 main-line locomotives, and electric traction equipment will be supplied by the British Thomson-Houston Company, Limited. The nine shunting locomotives are being supplied by the Drewry Car Company, Limited, and two manufacturers are providing the multiple-unit diesel trains—the Birmingham Railway Carriage & Wagon Company, Limited, and the Metropolitan-Cammell Carriage & Wagon Company.

Metropolitan-Cammell, Charles Roberts & Company, Limited, and the BR carriage and wagon works at Wolverton share the orders for sleeping cars.

Sir MAURICE BONHAM CARTER, who has been a director of Blackburn (Dumbarton), Limited, or associated companies for over 25 years, has retired as chairman: he is succeded by Mr. A. F. JOPLING. Mr. T. BANCROFT has resigned owing to pressure of other business.

Specifications for Copper-alloy Ingots and Castings

ABBF Comment on Draft Standard

A statement from the Association of Bronze & Brass Founders on the Draft British Standard for Copper-alloy Ingots and Copper and Copper-alloy Castings—Revision of BS.1400 reads as follows:—

History

Prior to 1942 there were many heterogeneous specifications for copper-alloy castings, some of which were British Standards but many were Services and private specifications, and they were unco-ordinated. With the loss of Malaya and the consequent curtailment of supplies of tin, action was taken by the Government to conserve this important strategic metal. This action stimulated interest in the properties of alloys and the possibility of substituting other alloying elements for tin. It was in these circumstances that STA 7—the first collected and co-ordinated series of copper-base alloy specifications—was evolved. Incidentally, this work and the efforts to conserve fuel led to the formation of this Association.

After the war STA 7 came to be regarded as purely a Services standard and the need for a more general series of specifications brought BS.1400: 1948 into being. It should be appreciated that this standard was put together in conditions which did not allow careful study and investigation of the properties or of the composition of the alloys as closely as could have been desired. It was a collection of the information then readily available.

In the interval, the needs of engineering industry have changed, there has been an opportunity to investigate more fully the properties of the alloys and to suggest changes to improve quality and consistency. Better knowledge of the alloys leads not only to more enlightened application of them but also to the more economical production of castings in them. With the growing interchange of information, standards of other countries have also become more familiar and have reflected in some cases unfavourably on UK alloys. According to the information already available, the Technical Committee of the Association of Bronze and Brass Founders believe that the proposed level of impurities and mechanical properties will be consistent with the International Standards being prepared by the International Standards Organization.

Progress of the Revision

The NFE/14 Committee of the BSI first met at the end of 1953 to revise the standard and a working party of six was formed to co-ordinate the proposals made by the Services and all branches of industry. This Association was permitted one representative on the working party.

The ABBF had three private meetings with the Ingot Makers in August 1953, January 1955, and January 1957, in order to put forward joint proposals for consideration. Complete agreement was reached by the two Associations at these three meetings and the Ingot Makers gave their assurance that the proposed alterations would *not* cause them any difficulty and would *not* increase costs at all. It was a complete surprise, therefore, when the Brass and Bronze Ingot Makers Association reversed their views when the draft was almost completed and their action in circulating their letter* dated March 17, 1959, is severely deprecated. The Technical Committee believe that the views belatedly expressed by the Ingot Makers are only the views of a very small minority, representing as little as 10 per cent. of ingot production.

The ABBF throughout the revision obtained permission of the BSI to discuss the proposed amendments unofficially with its members. In consequence, many letters have been circulated, information has appeared in the ABBF *Bulletin*, and special meetings have been held to obtain members' views. Whilst it is impossible to satisfy all these views it is believed that the proposals now before the NFE/14 Committee represent the big majority of members' views in all cases.

Nevertheless, many of the revisions are as a direct result of requests by industry in general, including valve makers, the railways, the oil industry, the chemical industry, the Services, and others. The majority view of the ABBF members is that BS.1400 should not be inferior to Continental and US specifications when, in fact, the alloys produced in this country are, in most cases, superior in quality.

Number of Alloys

There has been criticism of the draft BS.1400 standard because the number of alloys is increased. It is true that twelve alloys are added, but if the standard replaces Admiralty, M.O.S., Air Board, British Railways, oil companies, and private specifications, it would, in time, effect a considerable reduction in the number of specifications in use; and to have them all in one book is a considerable advantage.

The omission of SB1 is because the review made by the Association showed the use of this alloy to be so small. LB3 is omitted because with the added leaded bronze specifications the range of requirements is much better covered than before, and the chemical plant manufacturers who were the chief users of LB3 have agreed to the change.

Mechanical Properties

The required properties have in some cases been changed. These changes are mostly, but not always, increases. This has been done to reflect more faithfully the properties obtainable in a test bar and,

* See statement from the British Bronze and Brass Ingot Makers Association published in the JOURNAL, March 19, page 337.

with the single exception of AB2, experience is that the new properties are easily attainable and allow a considerable margin. In the case of AB2 the properties can only be obtained with a very high grade alloy to the correct composition; it is to protect this composition and the anti-corrosion and other important properties which it imparts, that the properties required have been increased.

Impurity Limits

There is a growing interest in the effects of impurities on copper-base alloys, especially on the Continent and for some time foreign specifications have set detailed impurity limits, for example:

Germany

The tin bronzes and gunmetals DIN, GBz and Rg series quote individual limits for a number of impurities including antimony, iron, manganese, bismuth, aluminium, magnesium, sulphur, arsenic, and nickel.

Antimony varies from 0.1 to 0.5 per cent. maximum; iron varies from 0.2 to 0.3 per cent. maximum; the maxima for the other impurities are: Manganese, 0.2; bismuth, 0.01; aluminium, 0.01; magnesium, 0.10; sulphur, 0.05; arsenic, 0.15, and nickel, 0.50 per cent.

USA

In the ASTM specifications, impurities are detailed for ingots, for example: for tin bronze 1A, 88/10/2, casting specification B143-52 lists impurities:—Lead 0.30 max.; Nickel 1.0 max.; Iron 0.15 max., and Phosphorus 0.15 per cent. max., but the corresponding ingot specification lists:—Lead 0.25 max.; Nickel 0.75 max.; iron 0.10 max.; Antimony 0.25 max.; Sulphur 0.05 max.; Aluminium none (defined as 0.005 per cent. when determined as a 10 gm. sample); Silicon 0.005 and Phosphorus 0.03 per cent.

Belgium

The Belgian equivalent of alloy G2 details limits as follows:—Lead 1.0 max.; Phosphorus 0.05 max.; Antimony 0.2 max.; Iron 0.25 max.; Manganese 0.2 max.; Aluminium Nil; Sulphur 0.05 max.; Nickel 1.0 max., and Silicon Nil per cent.

There is evidence that impurities in excess of those set out in the BS.1400 draft are harmful; therefore the impurity limits detailed in foreign specifications cannot be dismissed as meaningless. Moreover, as these impurities frequently have as much effect on the satisfactory production of castings as on the properties of the alloy, it is in the foundryman's interest to ensure freedom from the impurities which have been stated in the specifications. It is undesirable that British specifications should come to be regarded as inferior to those of competitor countries.

Specific Comments

The following notes represent specific comment on the alloys included in the specification:—

High-conductivity Coppers

These are introduced as the present standard does not include high conductivity copper. A 95 per cent. conductivity for HCC1 should be reached, and even exceeded, without difficulty if high purity copper is used and should encourage the use of castings instead of wrought products.

Phosphor-bronzes

PB1 is fully equivalent to Air Board 2B8 and acceptable to the AID; PB4 has been introduced to regularize and standardize "Commercial B8."

Leaded Phosphor-bronze (*LPB*1).—The Technical Committee has decided to recommend that zinc remain at 2 per cent. max. as at present, instead of 1 per cent. as proposed, leaving users who require the lower limit so to specify.

Lead Bronzes

In these the range has been considerably extended to meet the needs of industry:—

*LB*2-C.—It is recommended that the elongation, for sand-cast bars, be reduced to 5 instead of 8 per cent. as proposed.

Gunmetals

*G*1 *and G*2.—In the light of the work done by the British Non-Ferrous Metal Research Association on gunmetals, it is to be proposed that lead be increased from 0.50 to 1.0 per cent. as it is considered that this will assist founders in improving pressure-tightness and the mechanical properties as well as reflecting favourably on the price of ingots and the economical production of castings.

Leaded Gunmetals

Two higher-grade gunmetals have been introduced, LG2 (a) and LG3 (a); for these, the compositions, with the exception of impurities, are the same as the existing specifications. Impurity limits have been introduced in line with general policy (because without limitation it is difficult to obtained pressure-tightness) and to avoid the necessity of the Admiralty issuing their own specification for LG2. Increased mechanical properties are introduced at the request of the Valve Manufacturers' Association, who point out that LG2 and LG3 are, on paper, inferior alloys to the corresponding American alloys. The present LG2 and LG3 alloys supplied by reputable makers are considered adequate for the requirements of LG2 (a) and LG3 (a).

Existing specifications are retained as LG2 (b) and LG3 (b) at the request of the ingot manufacturers, which the ABBF has not opposed, although two grades of alloy are considered quite unnecessary. If two grades are retained (which it is hoped will not be the case) it is suggested that LG2 (a) and LG3 (a) should not be called "higher grade" but say "valve alloy."

It will be noted that the zinc content of LG3 (a) and LG3 (b) has been reduced with the

objective of permitting this specification to take the place of 86/7/5/2 and 87/7/3/3 alloys.

Aluminium-bronze

AB2.—The reputation of this alloy depends on its high strength and even more on its resistance to corrosion and corrosion fatigue. These qualities are impaired if metal of the highest quality, preferably prepared from virgin metal and strictly within chemical specification, is not used. The quality of the metal is accurately reflected in the properties of the test-bar and it is to safeguard the reputation of the alloy that increased properties (for sand cast material) of 42 tons tensile and 15 per cent. elongation have been inserted in the draft. The principal requirements for this alloy would necessitate full chemical analysis of every melt if the mechanical properties proposed are reduced. The Admiralty, in particular, would insist on it. Nevertheless, to meet the strong minority views expressed by members, the ABBF are proposing a reduction of tensile strength to 41 tons per sq. in., and will endeavour to obtain the support of the Services.

Copper/Magnesium/Aluminium Alloys

The inclusion of these alloys has been requested by the Patentees and the Admiralty. There are many precedents for their inclusion, which is in accordance with BSI policy.

Brasses

These specifications have been distinctively titled SCB for sand castings, and DCB for die-castings. It will be noted that in the specifications for sand-cast material, except for SCB6, no total-impurity limits are stated. In general 1 per cent. is recommended. There are two new alloys, SCB4 and 5; the remainder follow closely the existing specifications, with elongation for SCB1 and SCB3 increased to 20 per cent.—a more realistic figure. One die-casting alloy, DCB3, has been added as this is currently in use.

High-tensile Brasses

The only changes are the addition of mechanical properties for HTB1-C chill cast, and the 0.1 per cent. permanent-set stress is mandatory.

ISI Translations

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

1212 GRAUE, G., *et al.*: Extra Large Spectrographic Apparatus and Its Application in the Examination of Iron and Steel. *Arch. Eisenhütt*, 1958, Oct., pp. 619-626. (£5 10s.)

1229 VARLET, J.: Care of Rolls for Hot Rolling Thin Sheets. *Rev. Univ. Hines*, 1945, Sept. 15, pp. 118-121. (£3.) (Abstract JISI, 1947, Dec., p. 638: The author indicates precautions which should be taken to prevent the premature fracture of quenched cast-iron rolls, and emphasizes the importance of the direction of rotation of rolls which should not be left to chance, and gives details of the maintenance needed before and after rolling, with special emphasis on the cooling period of rolls.)

1206 BASTIEN, P.: Cracking and Fracture of Steel Charged with Hydrogen. *Materialprüfung*, 1959, Jan., pp. 3-12. (£7.)

Translations in course of preparation include:—

1271 BRUNN, F.: Contribution to the Problem of Pin-hole Porosity in Steel Castings. *Giessereitechnik*, 1958, Dec., pp. 307-310.

1296 BORCHERS, H., and G. BAUR: The Influence of the Annealing time on the Structure and the Behaviour in Transformation of Plain-carbon Steels. *Stahl u. Eisen*, 1959, Feb. 19.

The initials HB etc. stand for the organization to which enquiries for translations should be made, quoting the reference numbers—addresses are quoted at the end of this item.

HB 4483 ADEL'SKAYA, F. S. and P. L. CHERNOVA: Aging of Alloy TsAM 4-1 (3.5-4 per cent. Al, 0.5-1.5 per cent. Cu, rest Zn). *Metallov. i. Termicheskaya Obra. Met.* 1959. vol. V. Jan 1. pp. 6-9. ($2.50.)

AGRANAT B.L.ED. Technology of non-metallic coating. (Russian book being translated by The Pergamon Institute) 1957.

HB 4482 AKSHENTSEVA, A. P.: Susceptibility of Stainless-steels to Intergranular Corrosion after Heat-treating. *Metallov. Obra. Met.* 1959. vol. V. Jan. No. 1, pp. 6-9. ($3.90.)

HB 4479 AL'FTAN, E. A.: Effect of Elastic Vibrations of Sonic and Ultrasonic Frequency upon Transformations in Metal and Alloys. *Metallov. Obra. Met*, 1959, vol. V, Jan. No. 1 pp. 6-9. ($7.75.)

HB 4363 BELYAKOV, B. S.: Effect of Melting Practice upon Properties of Stainless-steel. *Primenenie Vakuuma v Metallurgii, Moscow*, 1958, pp. 35-8. ($5.90.)

HB 4525 BRUK, B. I. and V. V. NYRKOVSKAYA: Chrome-Nickel Steel (Studies) by Radioisotope Method. *Metallov. Obra. Met.* 1959, Feb. vol. V. No. 2. pp. 22. ($4.00.)

HB 4528 CHERNOVOL, A. V.: Crystallization of Strontium-treated Cast Iron. *Metallov. Obra. Met.* 1959, Feb. vol. V. No. 2. pp. 37. ($2.50.)

HB 4534 GAVRILOV, P. D.: Heat-treatment of Metals in Oxygen-free Atmospheres. *Metallov. Obra. Met.* 1959, Feb. vol. V. No. 2. pp. 59. ($2.00.)

HB 4532 GLEBOV, I. F.: Induction Hardening of Brake Drums. *Metallov. Obra. Met.* 1959, Feb. V. No. 2. pp. 54. ($2.00.)

HB 4419 KALASHNIKOV, S. I. and N. P. KICHIN: Improved Method of Flaw Detection by Colouring. *Zavods. Lab.* 1957, vol. 23, pp. 806-8. ($2.85.)

HB 4531 KHAET, G. I.: Machinability of Steel and Cast Iron by Carbide Tools. *Metallov. Obra. Met.* 1959, Feb. vol. V. No. 2. pp. 49. ($3.00.)

HB 4418 KHIMENKO, N. V.: Flaw Detection by a Colouring Technique. *Zavods. Lab.* 1957, vol. 23. No. 7. pp. 803-6. ($3.90.)

HB 4542 KRESHCHANOVSKII, N. S. and I. E. ZABLUDOVSKII: Effect of Inoculants on Crystal Structure and Sulphur Distribution in Austenitic Cast Steel. *Metallov. Obra. Met.* 1959, Mar. vol. V. No. 3. pp. 33. ($3.50.)

VDEh LIFSHITS, S. I.: Manufacture of Various Steesl in Top-blown Basic Bessemer Converters. *Stal'*. 1958, vol. 18. pp. 979-983.

HB 4533 LIPCHIN, N. N.: How to Reduce Distortion of Tools During Quenching. *Metallov. Obra. Met.* 1959, Feb. vol. V, No. 2, pp. 56. ($2.75.)

HB 4544 NARYSHKIN, A. K.: Heat-treatment and Mechanical Properties of Parts of Magnesium Alloys. *Metallov. Obra. Met.* 1959, Mar. vol. V. No. 3, pp. 44. ($2.00.)

HB 4383 POPILOV, L. YA.: Small-size Instrument for Electropolishing and Electroetching of Microsections. *Zavods. Lab.* vol. 24, 1958. No. 7. pp. 890-2. ($2.25.)

HB 4361 SAMARIN, A. M.: Problems of the Use of Vacuum in Metallurgy. *Primenenie Vakuuma v Metallurgii, Moscow*, 1958, pp. 3-13. ($4.90.)

HB 4548 VERNER, E. E. and N. S. ZINOVICH: Properties of Bearing Materials at 20 to 125 deg. C. *Metallov. Obra. Met.* 1959, Mar. vol. V. No. 3, pp. 56. ($2.40.)

Symbols for sources of translations:
HB: Henry Brutcher, P.O. Box 157, Altadena, California;
VDeh: Verein Deutscher Eisenhüttenleute, Breite Strasse, 27, Düsseldorf, Germany.

WILLIAM H. CAPPER & COMPANY, LIMITED, Mayfair House, 8/9, Hertford Street, London, W.1, have been appointed agents in the United Kingdom and Northern Ireland for Demag, Duisburg, Western Germany. The equipment handled under this new arrangement includes mining equipment and compressors of all types for all capacities and pressures. Demag trained engineers are resident at the above address for advice and inquiries.

Equipment and Supplies

Rotary Electric Vibrator

A new design of rotary electric vibrator (Fig. 1) has been introduced by Sinex Engineering Company, Limited, North Feltham Trading Estate, Feltham, Middlesex, for use as a power unit in such equipment as feeders, conveyors, screens, knock-out beams and grids for foundries, compacting tables, shutter vibrators, and in the discharge of material from storage hoppers. Many of the disadvantages of the usual type of this machine, such as short bearing-life, overheating and cracked housings, are claimed to have been eliminated, and exhaustive tests have shown that amplitude and

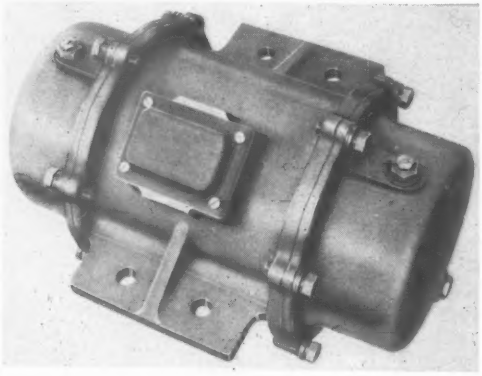


FIG. 1.—*Rotary electric vibrator, introduced by Sinex Engineering Company, Limited, designed for use with conveyors, knock-out beams and grids, etc.*

centrifugal force need not be sacrificed to ensure longer life of bearings and windings. Manufactured in four sizes, the vibrator is claimed to be dust-proof, simple to instal, and to need little maintenance. It can be provided with automatic timers for intermittent operation, and can also be fitted with flameproof connections. Oil or grease lubrication is employed, depending upon the intended duty.

Performance

It is more compact than previous models and, as in the past, consists essentially of a squirrel-cage motor carrying out-of-balance weights at both ends of the rotor shaft. The four sizes provide centrifugal forces of 300, 500, 1,960 and 7,600 lb. respectively (these figures relate to running at the standard synchronous speed of 3,000 r.p.m.). Vibrators running at 1,500 r.p.m. (for handling or compacting certain difficult materials), or providing larger centrifugal effects, can be built to special order. Special windings other than the standard 440 v. 3-phase can also be provided. A four-bolt lug mounting is employed, but the two smaller models are available with an alternative pin fixing arrangement for use with shutter vibration for concrete placing and similar applications, where a single power unit has to be transferred quickly from one item of equipment to another.

Crucible-cover with Heating Elements

Electric Resistance Furnace Company, Limited, Netherby, Queens Road, Weybridge, Surrey, have introduced a crucible-cover fitted with solid rod heating-elements operating at low voltage. This lid is designed to maintain the temperature of molten aluminium. The elements enable a great intensity of heating to be obtained over a small surface area, and have a very long life. They are easy to instal and remove and are connected to the transformer by flexible cables. The lid is fitted with a lifting hook so that a crane may be used to place it on the crucible, where it is positioned by four bosses. It can be made to fit existing holding pots of normal capacities, or alternatively, complete crucible assemblies can be supplied.

Graphitic-type Tool Steel

English Steel Rolling Mills Corporation, Limited, Openshaw, Manchester, are producing a graphitic-type tool steel known as M.I.C.8. It is an oil-hardened tool steel, claimed to have freedom from distortion in heat-treatment equal to that of conventional carbon-manganese "non-distorting" steels. It has a higher carbon-content than conventional steels, and a portion of the carbon is retained in the final product in the form of graphite particles uniformly dispersed throughout the structure. These particles act as a lubricant and considerably improve its machinability, also reducing the tendency to seize, gall, or score induced by the rubbing of metal against the surface of the tool. M.I.C.8 is claimed to be ideally suited for components of intricate shape which have to withstand wear and abrasion.

Lightweight Angle Drills

The range of lightweight drills produced by Consolidated Pneumatic Tool Company, Limited, of 232, Dawes Road, London, S.W.6, has been extended by the introduction of two new models, with angle heads of 45 and 90 deg. respectively. Each model is available in free spindle speeds of 5,000 or 3,000 r.p.m., with a built-in adjuster for speed variation, and has a capacity of $\frac{7}{8}$ in. Weighing only $1\frac{1}{4}$ lb., the units have a lever-type throttle, and are fitted with adjustable exhaust deflector and suspension bail. The spindle and rotor turn on ball bearings, whilst needle bearings are used for mounting idler pinions. Lubrication is achieved by a built-in oiler which serves all gears and bearings.

Oxide Refractories

An exhibition of Purox oxide refractories will be presented at the Mayfairia Rooms, Bryanston Street, London, W.1, from May 5 to 7. Recent development at Morgan Refractories, Limited, Neston, Wirral, Cheshire (a subsidiary of Morgan Crucible Company, Limited), has resulted in laboratory ware in these highly-refractory materials becoming available with a greater degree of purity, and in a wider range of shapes and sizes, than has been possible in the past. The range at present includes Alumina, Thoria, Magnesia, and Lime-stabilized Zirconia.

K. S. PAUL (MOLYBDENUM DISULPHIDE), LIMITED, Great Western Trading Estate, Park Royal Road, London, N.W.10, are now marketing their new general-purpose-paste 100 applicator-tubes. The paste is claimed to be suitable for: anti-scuffing and anti-seizing applications; running-in and first aid, and tapping and drilling of stainless steels, phenolic and other "difficult" materials.

Notes from the Branches

East Anglian Section

The 1958/59 session of the East Anglian section of the Institute of British Foundrymen closed on April 14 with the annual general meeting followed by a paper on "Modern Foundry Control," presented by Mr. V. W. Child of Crane, Limited, Ipswich. The retiring secretary, in making his report of the year's activities, mentioned that attendance had fallen by about 40 per cent. on previous years; illness, he thought, was probably the main reason for this. Referring to the annual expenditure of the section, he said that his had again been reduced.

Following the secretary's report, the president, Mr. A. M. Whipp, presented the prizes for the short paper competition, held in March for the L. J. Tibbenham award. Prizewinners in the senior and junior sections of the competitions were Mr. F. C. Baselow and Mr. R. I. Siegwart respectively. Mr. Baselow receiving his prize for a paper on "Problem Castings and Some Success in Using Condensers," and Mr. Siegwart for "Cavities in Castings." In making the presentation, the president read a letter from Mr. L. J. Tibbenham, regretting that he was unable to present the prizes personally, but congratulating the winners and wishing them further success in the future.

At the election of officers for the following sessions, the president told members that the section Council recommended that, for a few years at least, the senior officials should hold office for two years. This was put to the meeting and passed unanimously. The officers elected were: as president, Mr. T. D. Oughton, and as senior vice-president, Mr. B. R. Lock. The secretary, who had already mentioned that the duties were onerous, and that he was finding it impossible to do the job properly, then proposed that Mr. K. Bolton be his successor, and this was agreed without dissent.

"Modern Foundry Control"

The business of the meeting being concluded, the president introduced the lecturer, Mr. V. W. Child, who was well known to members, being a past-president of the section. His paper on "Modern Foundry Control" was well illustrated with slides, and was of the high standard usually associated with the author. In it was stressed the value of accurate reports and correct records, and the need for incentive and careful workstudy. Many sides of this most interesting subject were dealt with, special reference being made to the working of hot-blast cupolas and the duplex system as installed at the author's works. The paper was followed by a very lively discussion which amplified many of the points already made, and brought out others. Time, again, proved the enemy, and the discussion was closed with Mr. B. R. Lock proposing a vote of thanks to Mr. Child, which was passed with acclamation.

Future Arrangements

Finally, members were informed that meetings next session would be held on the third Monday each month, with the exception of that in April, when the meeting would be held on the second Monday; the Short Paper Competition would again be held, and the papers would be read at the February meeting; that, as the London branch were to be hosts at the National Works Visits Day this year, there would be no section works visit at the commencement of next session; and that the section social evening would be held at the end of October or early in November this year.

Lancashire

The Lancashire branch held its annual general meeting at the Midland Hotel on April 25. The secretary, Mr. F. W. Nield, in reporting on branch activities for the 1958/59 session said that there had been an increase in membership over the year, on balance, there were five more members, 18 more associate members and 12 more associates. Six lectures had been given by such able lecturers as Mr. D. Fleming who opened the session with a paper on the "Controlled-slag Hot-blast Cupola"; Mr. H. Pinchin, who had given some interesting information on sand slinging moulds in his paper entitled "Some Practical Experiences of Making Moulds in a Mechanical Foundry"; Mr. H. Paton Millar's paper had covered "Production of Medium-size Ingot Moulds"; whilst Mr. J. F. Bowers had dealt with the use and development of epoxy resins for patternmaking in a paper on "Use of Epoxy Resin in the Foundry." In view of the present state of the foundry industry Mr. A. Kirkham's paper on "Foundry Management" has been especially interesting, and finally Mr. R. G. Nicholas had presented a paper dealing with "Precision Casting" which was an unusual subject for the branch.

A "unique" works visit had taken place in March, when 36 members had travelled by air to and from Manchester and Stanstead airports for a visit to the new Thames Foundry of the Ford Motor Company. Social activities had been well catered for, and Mr. C. M. G. Wallwork and the social committee were to be congratulated on arrangements made, particularly in regard to the organization of the annual dinner/dance held at the Grand Hotel, Manchester, in January. Mr. Wallwork was also to be congratulated for his work in connection with the John Wilkinson Short Paper Competition. The papers submitted had again been of a high standard. Mr. Nield then referred to the Stoke-on-Trent section which, he said, was now well established and going from strength to strength.

Finally, the secretary paid tribute to the branch president, Mr. H. Booth, and concluded by saying that this would be his last report, and recorded his thanks for the help received during his seven years as hon. secretary of the branch. Mr. Nield is to be followed in office by Mr. H. Buckley (44, Woodbridge Avenue, Audenshaw, Manchester).

In the business part of the meeting the following were elected or appointed for the 1959/60 session: as president, Mr. C. M. G. Wallwork; as senior vice-president, Mr. F. W. Nield; as junior vice-president, Mr. F. Lord; as delegates to IBF General Council, Mr. H. Booth; Mr. E. H. Beech; Mr. W. Spenceley: and Mr. E. Jackson; as representative on the Technical Council, Mr. G. Southern, and as hon. treasurer, Mr. F. A. Harper.

DAMAGE was caused to five large annexe buildings at the Ashorne Hill training centre of the British Iron and Steel Federation by a fire which broke out on April 22. Mr. G. Smiley, director of the Federation, said afterwards that although the fire had destroyed two conference rooms used for storing the Federation's historical records, the main building was unaffected. The planned programme of management training courses would be carried out in the normal way.

American Letter

Casting Mass and Solidification*

The effect of casting mass on strength and ductility varies widely from one metal to another. For instance, the tensile strength of grey iron decreases by over 40 per cent. if the thickness of the casting is increased from ¼ to 1¼ in. The strength of s.-g. iron of similar chemical composition, on the other hand, is little affected by changing the section size. Analysis of previously published data on the effect of section size on the tensile properties of cast metals has indicated that solidification time is of greater significance than section size.

Test Method

A surprisingly good correlation is obtained if tensile strength is plotted against time of solidification. This evidence suggests that the most important influence on the strength of a casting is indeed time of solidification, and not section size. S.-g. iron and steel (in the annealed state), and aluminium and magnesium alloys in the solution-heat-treated and precipitation-hardened conditions, were selected for test purposes. With grey iron it was necessary to use as-cast data, because of lack of available information on other conditions of the

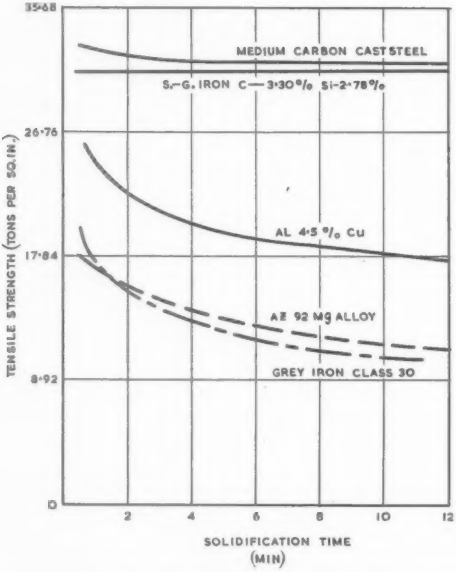


FIG. 1.—*Graph showing tensile strength plotted against solidification time, for five different alloys.*

metal. It is evident from Fig. 1 that a unique relationship between strength and freezing time holds for all five materials over the range investigated.

Results

If the fracture at elongation remains larger than the necking stretch, an increase in freezing time (no matter how much it affects ductility) will not reduce the tensile strength appreciably, but if fracture at elongation falls below the necking stretch, the tensile strength is influenced by the freezing time. It has been postulated that tensile strength is reduced by increasing solidification times if the ductility during tensile-testing is insufficient to exceed the necking strain. However, as long as the metal is sufficiently ductile to exceed this limiting value, the tensile strength is virtually unaffected by changing solidification times. Ductility

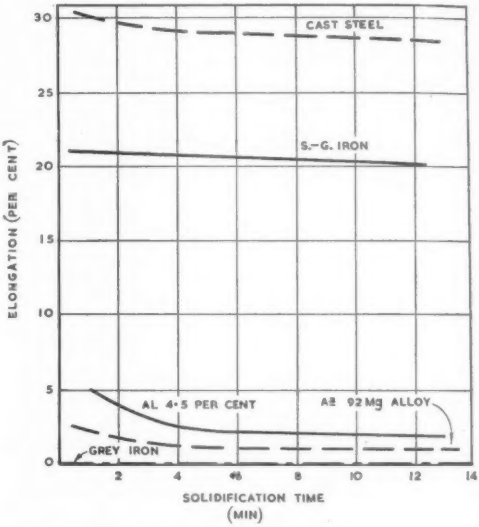


FIG. 2.—*Graph showing ductility* versus *solidification time, for the same five alloys as are mentioned in Fig.* 1.

values for the five metals considered were also plotted against time of solidification (see Fig. 2). Grey iron and the aluminium- and magnesium-base alloys, whose tensile strength is strongly affected by freezing time, display low fracture ductilities. In contrast, the strength of s.-g. iron and cast steel is little influenced by solidification time, and they also exhibit high ductility.

These hypotheses permit prediction of the tensile behaviour of a cast metal at various section sizes, on the basis of limited test data.

Correction. The papers contained in the article "Symposium on Gases in Light Metals" (page 301, March 12 issue of the JOURNAL), were stated to have been given "at a recent meeting in America of a section of the American Society of Metals." In actual fact this meeting was organized by the American Institute of Mining and Metallurgical Engineers. Apologies are made for any inconvenience which this error may have caused. Further enquiries reveal that so far no arrangements have been entered into for the full publication of the papers.

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*Synopsis of a paper presented at the AFS Congress in Chicago (April 13 to 17) by G. W. Form, P. J. Ahearn and J. F. Wallace. G. W. Form is Asst. Prof., and J. F. Wallace is Assoc. Prof., of Metallurgical Engineering at the Case Institute of Technology, Cleveland. P. J. Ahearn is Metallurgist at the Rodman Laboratory, Watertown Arsenal, Watertown, Mass.

Company News

Sales of Vickers, Limited, for 1958, excluding sales within the group, contracted from £196,260,000 to £176,850,000, and orders in hand, excluding sub-contracts placed within the group, show a reduction from £376,000,000 to £312,000,000. Stock-in-trade and work-in-progress amounted to £128,060,000, against £141,440,000, less instalments on contracts £78,460,000 (£83,820,000), leaving £49,600,000 (£57,620,000).

An unchanged final dividend of 7½ per cent., making 10 per cent., as previously, is announced. The 1957 interim was on the smaller capital before the rights issue. Group profits fell from £13,200,000 to £12,650,000, but after substantially lower tax the net balance is up from £6,200,000 to £6,590,000. As a result of the merger of Powers-Samas Accounting Machines, Limited, with International Computers & Tabulators, Limited, it has been considered misleading to consolidate the accounts of Powers-Samas for 1958. Vickers' interest in Powers-Samas has been dealt with purely as an investment and the corresponding adjustments have been made in the 1957 figures.

Group net profit of the English Steel Corporation, Limited, whose ordinary capital is owned by Vickers and Cammell Laird & Company, Limited, amounted to £2,275,152 for 1958, compared with £2,683,817. A final of 7 per cent. makes 10 per cent. on the £9,000,000 "A" held by Vickers and the £3,000,000 "B" held by Cammell Laird (12 per cent. total on £6,000,000 and £2,000,000, respectively, for 1957).

HARLAND ENGINEERING COMPANY, LIMITED—The company proposes a one-for-two scrip issue and is maintaining the 14 per cent. dividend with a 10 per cent. final for 1958. The group net profit is £9,349 higher at £100,264.

EDWARDS HIGH VACUUM, LIMITED—The final dividend is increased from 11 per cent. to 12 per cent. to make 16 per cent. for 1958 against 15 per cent. The group trading profits rose from £179,636 to £224,035 and the net profit from £76,458 to £107,268 after tax of £116,767 (£103,178).

VAB PRODUCTS, LIMITED, brassfounders and curtain-rail manufacturers, of London, W.1—The company is omitting a dividend for 1958. For the previous year the dividend was cut from 10 per cent. to 2½ per cent. A group loss of £315 is shown against a profit £7,254, after tax of £3,285 (£14,227).

GLENFIELD & KENNEDY HOLDINGS, LIMITED, hydraulic and general engineers, of Kilmarnock—A final dividend of 15 per cent. makes 20 per cent. (same). Group profit for 1958, after absorbing a loss of £456,539 incurred by the compressor business at Polmadie, amounts to £438,999 (£810,613).

LANCASHIRE DYNAMO HOLDINGS, LIMITED—In addition to a final dividend of 7 per cent., making 11 per cent. (same) there is a special bonus interim dividend for 1959 of 1½ per cent. which will not prejudice subsequent distributions for the current year. Group net profit is £836,466 (£746,565). A one-for-three capitalization issue is to be made.

HOPKINSONS, LIMITED, engineers and foundrymen, etc., of Huddersfield—A final dividend of 10 per cent. makes 17½ per cent. for the year to January 31, 1959, on capital doubled by a scrip issue, an effective increase of 1½ per cent. After a loss of £1,040 (£51,245 profit) on sale of investments, group profits show a reduction from £1,021,366 to £913,848.

CHURCHILL MACHINE TOOL COMPANY, LIMITED—A final dividend of 17½ per cent. makes 25 per cent. for 1958, against 27½ per cent. When the interim was reduced a final of not less than 15 per cent. was forecast. Owing to a much reduced tax charge of £270,500 (£407,000) the group net profit is practically unaltered at £344,262 (£344,564).

C. A. PARSONS & COMPANY, LIMITED, manufacturers of steam turbines and electrical machinery, etc., of Newcastle-upon-Tyne—With the final dividend of 3¼ per cent. for 1958, again making 7½ per cent., there is a special dividend of ⅝ per cent. for the current year. Group profits are down from £4,094,911 to £3,381,738, but the net profit is slightly higher at £2,091,284 (£2,013,648).

PLESSEY COMPANY, LIMITED, general engineers, etc., of Ilford (Essex)—The company proposes to increase the authorized capital by the creation of 8,600,000 additional 10s. ordinary shares and to approve the capitalization of £2,400,000 of reserves by issuing credited as fully paid, two new 10s. ordinary shares for each existing ordinary share. An extra-ordinary meeting is to be held on May 26.

WOLF ELECTRIC TOOLS (HOLDINGS), LIMITED—The report for 1958 states that the decline in income from difficult trading conditions was mitigated to some extent by the introduction of new products and greater publicity. The first quarter of 1959 has been an improvement on last year and indications are that this will be maintained. Group net profit was £86,003 (£126,741) and the dividend was maintained at 10 per cent.

BARTON & SONS, LIMITED, tubing and conduit manufacturers, etc., of Dudley (Worcs)—A final dividend of 6 per cent., making 10 per cent. (same equivalent) on the doubled capital for 1958, is announced together with a special non-recurring dividend of 2½ per cent. for 1959 which will not be taken into account when the current year's dividend is considered. The net profit advanced from £373,979 to £444,189.

C. & J. HAMPTON, LIMITED, engineers and toolmakers, etc., of Sheffield—The year-end date has been altered from June 30 to September 30, resulting this year in a trading period of 15 months to September 30, 1959. The first interim dividend of 4 per cent. will be paid on June 10. It is proposed to pay a second interim in December and a final immediately following the meeting in February, 1960. Subject to no unforeseen circumstances arising, the board expects that trading results will allow total dividends for the 15 months at not less than the equivalent of those paid for the previous year. For future 12-month trading periods it is proposed to pay the interim in August and the final in February.

PULSOMETER ENGINEERING, LIMITED—Group profit, including new subsidiaries, for 1958 is £405,591 (£484,025, but taking full year's earnings for all companies now consolidated, the comparative figure would have been approximately £618,000). A final dividend of 12½ per cent. makes 20 per cent. on increased capital, against 25 per cent. Referring to the negotiations for the purchase from Swain Holdings, Limited, of the J. Caslake capital, which has not resulted in the acquisition, the directors state that Swain Holdings has launched proceedings claiming that there was a binding contract to purchase the shares and seeking to enforce its performance. The group accounts show charges of £22,300 for compensation to former directors. This includes a provision of £6,300, which comes up for approval at the annual meeting on May 12, for Mr. R. G. W. Bliss, who resigned in December, 1958.

Publications Received

Journal of Research and Development. Vol. 7, No. 10. Issued by the British Cast Iron Research Association, Alvechurch, Birmingham.

This issue opens with a long report from Mr. G. N. J. Gilbert on the "Growth and Sealing Characteristics of Cast Iron in Air and Steam." From his very extensive experiments he has drawn the following conclusions:

Growth tests in steam have shown that (with the exception of a very-high-carbon iron) cast irons treated for 49 weeks at 427 deg. C. are structurally stable and no growth was observed. Tests in air have shown that cast iron shows no growth after treatment for 64 weeks at a temperature of 400 deg. C. A little growth was however generally observed at a temperature of 450 deg. C. for similar periods. This work was carried out to investigate whether there were grounds for raising the present limiting temperature of 232 deg. C. for cast iron in steam applications. It was thought that a limiting temperature of 343 deg. C. might be more realistic and, in fact, in America specifications are in use allowing cast iron to be used for steam applications up to this temperature. The results obtained appear to show that as far as growth is concerned 343 deg. C. is still considerably below the temperature at which growth was detected in tests running for periods of 49 weeks in steam and for 64 weeks in air.

Scaling results in steam were of little value because scale apparently became detached in superheated steam atmospheres due, most probably, to the scouring action of the steam. At 226 deg. C., however, in saturated steam, scaling was of an appreciably higher order than at similar temperatures in air, due, it is thought, to rusting because of contact with wet steam and water vapour.

Tensile and hardness tests carried out on the growth specimens held in steam for 59 weeks at 427 deg. C. and on specimens held in steam at lower temperatures confirm the growth results; no change in tensile properties or hardness was found, indicating structural stability at such temperatures. Tensile and hardness tests carried out on the growth specimens, which had been held in air for periods up to 64 weeks at temperatures up to 400 deg. C. also confirmed the growth results and at these temperatures no change in mechanical properties was observed. Short-time high-temperature tensile tests on all materials confirmed the results of other workers that cast iron retains its strength up to 400 deg. C.

A second report comes from Mr. T. J. Szajda on the "Effect of Carbon, Silicon and other Factors on the Shrinkage Behaviour of Grey Cast Iron." He concludes his report by the following statement:—

(1) Internal porosity does not occur in green-sand-moulded cylindrical castings of the type studied over a wide range of carbon and silicon contents when the phosphorus content is negligible.

(2) When one per cent. of phosphorus is present internal porosity increases with increase in carbon equivalent content and with increase of eutectic graphite content.

(3) The effect of carbon equivalent and eutectic graphite is contrary to that predicted from a knowledge of the constitution and solidification sequences of grey iron, but may be due to eutectic solidification expansion enlarging the casting instead of causing self-feeding. The mould rigidity may be an important factor in this.

(4) The external surface shrinkage increases with decrease in eutectic graphite content and is likely to be at a minimum in irons of eutectic composition. This is in accordance with fundamental concepts.

The third contribution is by Mr. K. E. L. Nicholas and is on the "Influence of Mould Rigidity, Pouring Temperature and Metal Composition upon the Soundness of Fed Nodular and Flake-graphite Iron Castings." Mr. Nicholas's conclusions are as follows:—

(1) The soundness of nodular-graphite cast irons is closely related to casting expansion and mould rigidity. Castings in green-sand moulds show swelling and unsoundness but rigid cement/sand moulds produce a marked casting contraction and improvement in soundness. A 100 per cent. yield of sound casting may sometimes be obtained employing a cement sand mould.

(2) In hypo-eutectic nodular-graphite irons of fixed composition and pouring temperature there is a linear relationship between casting expansion and the quantity of feed metal required as measured by the volume of feeder-head pipe.

(3) Casting expansion is dependent on the moulding material and pouring temperature employed. In green-sand moulds a strong trend exists for the casting dimensions, weight and feeder-head pipe volume to increase with increasing pouring temperature. In cement/sand moulds there is a tendency for casting dimensions to decrease with increasing pouring temperature.

(4) The casting expansion and feeder-head pipe volume of hypereutectic nodular-graphite irons increases with increasing carbon equivalent content and pouring temperature.

(5) The mechanical properties of sound nodular-graphite irons cast in green-sand or cement/sand moulds are similar.

(6) The use of a cement/sand mould in preference to green sand also increases the soundness of low- and high-phosphorus flake-graphite cast irons.

"Dust in the Ironfoundry" is the title of the final report, prepared by Dr. H. T. Angus and Mr. W. B. Parkes. This paper summarizes the available background knowledge relating to pneumoniconiosis as it occurs in the ironfounding industry. The main sources of dust in the ironfoundry are stated; the causation of pneumoconiosis and its progress are also summarized. Short sections deal with the actual composition of dust and methods of estimation. A further section outlines the main systems of control which are available and a schedule is given in the form of a table, indicating the control methods which are most suitable in the various operations for four main types of foundry.

Conference on Computers in the Iron and Steel Industry. Published by the Operational Research Department of the British Iron and Steel Research Association, 11 Park Lane, London, W.1.

This is a full report, incorporating the papers delivered and the subsequent discussions, of the conference organized by the British Iron and Steel Research Association's operational research department at the Institute of Mechanical Engineers last year. This was, in fact, the first conference held by the steel industry on a subject of great potential importance to all its constituent firms.

Portable Power Hack-Saws. W. Kennedy, Limited, West Drayton, Middx, have issued an eight-page booklet covering the potentialities of their Mark II portable power hack-saws. These possess several novel and interesting features, such as a calibrated vice-jaw; saw-blade clamps-screws on the right-hand side of the machine, and a saw-frame arm fitted with thumb-pressure release for raising and lowering it.

Personal

Mr. RONALD HARRISON has been elected a director of Triplex Foundry, Limited.

Mr. W. R. NORTHCOTT has been elected a director of English China Clays, Limited.

Head, Wrightson & Company, Limited, Sheffield, announce that the EARL OF HALSBURY has joined the board of Head Wrightson Processes, Limited.

Mr. C. W. SIMPSON has been appointed secretary and a director of Keeton, Sons & Company, Limited, engineers, Keetona Works, Sheffield, a member of the Firth Cleveland group of companies.

Mr. J. BUSFIELD, accountant and assistant secretary to the company since 1950, has been appointed company secretary of Crofts Engineers (Holdings), Limited, and Crofts (Engineers), Limited, of Bradford.

Miss DOROTHY BARNES, secretary of E. A. Barnes & Sons, Limited, iron, steel and metal merchants, of Lichfield, has been elected hon. vice-president of the Midland Metal and Allied Trades Association.

Mr. G. W. GROSSMITH has been appointed chairman and Lieut.-Col. ERIC WARD managing director of Strachan & Henshaw, Limited, manufacturers of mechanical-handling plant, Steelhoist Works, Bristol.

Mr. ARTHUR W. MANN, chief clerk, Allan & Sons, Limited, Bon Lea Foundry, Thornaby-on-Tees, has retired after 52 years' service with the company. To mark the occasion he received presentations from the management and from his colleagues.

Mr. ARTHUR WILLIAMS has been appointed a director of Denis Ferranti Meters, Limited, Bangor, and the Denis Ferranti Company, Limited, Royton. Mr. Williams joined the Denis Ferranti group in 1952, and was appointed group general manager in 1957.

Mr. ROBERT E. GARDNER has resigned his position of foundry engineer with Campbell, Gifford & Morton, Limited, consulting engineers, on his appointment as contract manager with the Davy & United Engineering Company, Limited, construction division, Sheffield.

The West Midlands branch of the Institute of Export has elected as chairman Mr. P. W. UNDERHILL, chief shipping officer of Birlec, Limited, Birmingham. Mr. Underhill joined the branch in 1939 and was elected to the local committee in 1950, later becoming vice-chairman.

Mr. J. T. W. DEWAR, managing director, Firth-Viskers Stainless Steels, Limited, Staybrite Works, Sheffield, presented 15 employees with safe-driving awards on April 24. They included Mr. C. L. OLIVER, an employee for 40 years, who received a brooch for 30 years' consecutive safe driving.

Sir LAURENCE HELSBY, K.B.E., C.B., has been appointed Permanent Secretary of the Ministry of Labour and National Service in succession to Sir Harold Emmerson, G.C.B., K.C.V.O., who will be retiring from the public service at the end of the summer. Sir Laurence Helsby's appointment will take effect from September 1 next.

Mr. JOSEPH STAVES, a local director of Thos. W. Ward, Limited, Sheffield, has retired after 56 years' service with the firm. He was chief accountant from 1920 to 1956. He has received presentations from the directors, local directors, and senior colleagues on the staff at the Albion Works, Sheffield, and at the London office.

Mr. J. T. LIDBURY has been appointed managing director of Hawker Aircraft, Limited. Mr. R. H. CHAPLIN has been appointed an executive director and chief designer and Mr. E. G. RUBYTHON, an executive director. Sir SYDNEY GAMM has been appointed chief engineer and Mr. J. A. R. KAY and Mr. S. D. DAVIES have become directors.

Mr. R. HADFIELD, a local director of Thos. W. Ward, Limited, Albion Works, Sheffield, was elected president of The Silica and Moulding Sands Association at the annual general meeting on April 16. He has been vice-president for the past two years. Mr. Hadfield also represents his company on the Council's of the Pig-Iron Merchants' Association and the Foundry Coke Merchants' Association.

Mr. W. MORLAND FOX has been appointed chairman of W. J. Jenkins & Company, Limited, engineers, Retford. He will also continue as joint-managing director with Mr. B. POLLARD. Mr. Morland Fox who has been associated with the firm since 1933, joined the company as assistant London manager. He succeeds Mr. J. S. JEFFREY, who has retired and had held the position of deputy-chairman and chairman.

Mr. PETER J. A. LUBBOCK, publicity manager of Dewhurst & Partner, Limited, Hounslow, has recently relinquished this position to take up an appointment as advertising executive with Evershed & Vignoles, Limited, of Chiswick. Mr. Lubbock was previously publicity manager of Langley Alloys, Limited, and was for six years publicity officer with Chaseside Engineering Company, Limited, Hertford.

Mr. GRAHAM W. DONOVAN, director of the Birmingham firm of Donovan Electrical Company, Limited, has been elected chairman of the Midland Council of the National Union of Manufacturers. Mr. Donovan has been chairman of the Birmingham area committee since 1957, and also serves on the NUM National Executive and its finance and recently formed anti-nationalization committees. He succeeds the late Mr. GILBERT SALTER in the chair of the Midland Council.

Mr. J. H. OSBORN, a director of Samuel Osborn & Company, Limited, Sheffield, together with Mr. R. F. HORTON, a director and general manager of the Osborn Foundry & Engineering Company, Limited, and Mr. T. A. MARSDEN, works manager of Osborn Precision Castings, Limited, have been awarded a diploma by the Institute of British Foundrymen in recognition of their joint authorship of the paper entitled "A Modern Foundry for the Manufacture of Small Steel Castings by New Moulding Techniques." The diploma will be presented at the annual IBF conference at Scarborough.

Obituary

The death has taken place of Major CHARLES MITCHELL, a director for some years of Armstrong Whitworth & Company, Limited, the Newcastle-upon-Tyne engineering firm. He was 76.

Mr. CHARLES STANLEY NOBLE, joint managing director of Noble & Lund, Limited, machine-tool manufacturers, of Felling-on-Tyne, Gateshead, has died at the age of 66. He had been with the firm for 48 years.

The death occurred on April 22 of Mr. JABEZ NICHOLSON, at the age of 78. Mr. Nicholson retired in 1935 after 42 years with J. Blakeborough & Sons, Limited, valve makers, Brighouse. A magistrate since 1938, he had been a Brighouse Town Councillor and a Clifton Parish Councillor.

News in Brief

THE FOUNDRY of John Taylor & Company, Loughborough, and the works of Brush Electrical Engineering Company, Limited, are to be toured by the Duchess of Kent when she visits Leicestershire on June 2.

THE ANNUAL CONFERENCE of the International Meehanite Research Institute is being held at Sirmione on Lake Garda in Northern Italy from May 19 to 22. The papers to be read will cover a wide range of subjects of interest to the foundry.

THE BIRMINGHAM ENGINEERING CENTRE, acting for some 5,000 firms from all parts of the UK, will represent the British engineering industry in a group display which it is organizing at the National Industrial Production Show of Canada, at Toronto, from May 4 to 8.

Mr. H. GILBERT RAMSELL, general manager of the British divisions of the Yale & Towne Manufacturing Company, presented long-service awards to employees of the divisions at a ceremony held at the Willenhall headquarters on April 20. Three recipients had completed 50 years' association with the company.

NO FEWER THAN 194 employees of the Pressed Steel Company, Limited, have been presented with silver membership badges of the company's 25 Year Club and with commemoration gold watches. The presentations were made by the company's chairman, Mr. Alex Abel Smith, at the Club's new division in Oxford.

BRADFORD will be completely smoke-controlled by the end of 1970 in accordance with the programme approved by the Bradford Corporation Health Committee, on April 15, for submission to the Minister of Housing and Local Government. The plan covers a total of 25,503 acres, and affects about 98,000 houses.

LUDLOW BOROUGH COUNCIL has formed an Industry and Development Committee to attract industry to the area and, on April 16, members met representatives of the National Union of Manufacturers and of the Federation of Industrial Development Associations. One of the delegates was Mr. William Blackwell, past-president of the N.U.M.

AT A MEETING of the Association of Bronze & Brass Founders (Midland Area) to be held at the Victoria Hotel on May 5, Mr. W. H. Davies will give a talk on the system advocated in the Association's publication "Costing a Casting." The talk will be preceded in the morning, commencing 11.45 a.m., by a discussion on current activities of the Association.

A STAINLESS-STEEL FRAME is to be used at a cost of £11 10s. for a new photograph of H.M.S. Sheffield which is to be hung in the foyer of the main entrance of Sheffield Town Hall. Two up-to-date photographs of the cruiser have been sent by the captain to Sheffield Estates Committee, who decided recently that the existing picture of the ship in the Town Hall was out-of-date.

THE LEGAL GROUNDWORK necessary to industrial managers and executives will be covered in a three-day course on industrial and factory law to be given from May 26 to 28 by Mr. Harry Samuels, barrister-at-law, under the auspices of the Industrial Welfare Society. The course is to be held at the society's headquarters, Robert Hyde House, 48, Bryanston Square, London, W.1.

DURING HIS RECENT VISIT to London Senor Don Alberto Ullastres Calvo, the Spanish Minister of Commerce, had discussions with the President of the Board of Trade, Sir David Eccles, and the Economic Secretary to the Treasury, Mr. F. J. Erroll, on general economic questions and on the possibility of Spain becoming a full member of OEEC. This review showed a wide measure of agreement.

Mr. J. HUGH NEILL, the Master Cutler, is seeking to improve the acoustics of the Cutlers' Hall, and as a step towards this he has sent postcards to everyone who was present at the recent Cutlers' Feast asking them if they could hear the speeches from where they sat. Mr. W. G. Ibberson told this to Sheffield Rotary Club on April 20, when Mr. Neill addressed them on the subject of "Silence is Golden."

THE MASSON WORKS of George Fletcher & Company, Limited, engineers and manufacturers of sugar machinery, Litchurch Lane, Derby, were recently visited by five Russians, who are part of a team in this country investigating the possibilities of a supply of goods from British manufacturers. They were most interested in seeing several machines in course of erection for the British Sugar Corporation.

KODAK, LIMITED, announce the names of the winners of the first six scholarships in colour photography. They are Miss Rosemary White, Mr. Harvey Bennette, Mr. Terence Jones, Mr. Peter Larcombe, Mr. Alan Marshall and Mr. David Whiting. They will spend three months in America studying the techniques employed there and learning at first hand how some of the finest results in colour photography are obtained.

Professor N. J. PETCH (University of Leeds) is to give a lecture on the "Atomic Mechanisms of Fracture" at the Institute of Metals, 17, Belgrave Square, London, S.W.1, at 6.30 p.m. on Thursday, May 28. The lecture will take the form of a report on a conference of the same title recently held at Swampscott, Mass., under the auspices of the US National Academy of Sciences. Visitors will be welcome, and no tickets are required.

I.C.T., LIMITED, 17, Park Lane, London, W.1, announce the formation of I.C.T. G.m.b.H., a subsidiary company with headquarters in Düsseldorf. The new company will take over the existing business in Western Germany of Powers-Samas Accounting Machines (Sales), Limited, which has hitherto been conducted through a branch office in Düsseldorf. It will merge this existing business with the wider interests and resources of I.C.T.

MANUFACTURERS of cooking pots, steel ranges and cooking firing units are invited by the Director of Contracts and Purchases, Ministry of Defence, Baghdad, Iraq (Ordinance 1), to submit tenders for these goods. Details of quantities and specifications may be obtained from the Export Services Branch of the Board of Trade, Lacon House, Theobalds Road, London, W.C.1, reference ESB/9408/59. The latest date for receiving tenders is May 11.

IT IS REPORTED that as part of the expansion programme of the Standard Motor Company, Limited, the Tile Hill factory of Fisher and Ludlow, Limited, is to be taken over on November 1 by Mulliners, Limited, the body-building subsidiary of the Standard Company. It is anticipated that the factory which covers some 234,000 sq. ft. will be re-equipped and put into production by January 1960. The project is stated to be a further step in the Standard policy to reduce dependence on outside suppliers of car bodies.

Mr. W. D. PUGH, managing director of English Steel Corporation, Limited, presided over a conference for senior managements and executives of Sheffield industries concerned with authoritative sources of information, held in the Sheffield Central Library on

(*Continued on p.* 518)

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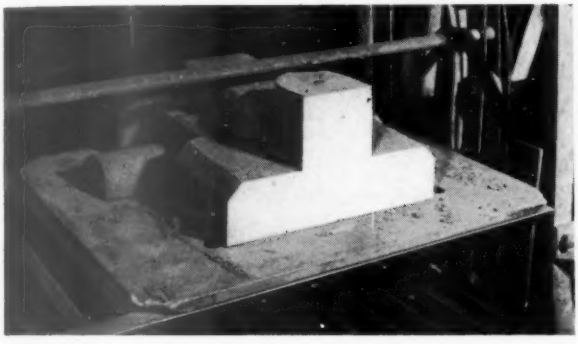

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News in Brief

April 23. Speakers included Mr. C. Hurst, deputy chairman of Samuel Osborn and Company, Limited, Mr. M. L. Pearl, head of the information department of the Iron and Steel Institute, and Dr. E. Brewin, intelligence officer of the British Iron and Steel Federation.

LORD MILLS, the Minister of Power, opened a new £1,000,000 heavy-engineering workshop at International Combustion, Limited, Derby, on April 24. It is concerned with the provision of equipment for nuclear-power stations and was completed in six months under schedule. Lord Mills said, "It is a measure of progress when one recalls that in 1945 British turbo-alternators were mostly of only 30 megawatts capacity, and now sets of 200 megawatts are being made and your firm is now constructing one of 500 megawatts."

UNEMPLOYMENT IN THE MIDLANDS continued to decrease, Mr. Stephen Burman, vice-chairman of the Midland Regional Board for Industry, reported on April 21 at the monthly meeting in Birmingham of the Board. He said that, the general impression was that the slight improvement noted at the meeting a month ago appeared to be continuing; it was a slow improvement but appeared to be steady. He added that the effect of the Budget had been to give rise to a certain degree of optimism, which was reflected in increased industrial activity.

MR. H. P. FORDER, director and general manager of Samuel Fox & Company, Limited, Stocksbridge, Sheffield, presented the cup and prizes at the 20th annual ambulance competition of the United Steel Company at Stocksbridge Victory Club Hall on April 18. The cup was again won by the Appleby-Frodingham team, who had been Lincolnshire group winners. They gained 230 points. Steel, Peech & Tozer, Rotherham, were second with 214, followed by Samuel Fox & Company, Limited, 211; and the Beckermet Mining Company with 194.

UNDER THE ARRANGEMENTS detailed in Notice to Importers No. 860 of July, 1958 (page 4, paragraph 15), an importer in the United Kingdom who received from his overseas supplier a request for an import certificate was asked to apply for the certificate to the Board of Trade, Import Licensing Branch. As from May 1, the responsibility for the issue of import certificates will be transferred to the Export Licensing Branch, Gavrelle House, 2 Bunhill Row, London, E.C.1, to whom all enquiries, requests for application forms and completed application forms should be sent.

A 92-TON CASTING on a bogie travelling from Glasgow to Sheffield sank eight inches in a recently-laid tarmac stretch of road at Cottage Bank, near Belford, south of Berwick, on April 23. The casting is to be used in steel-pressing in Sheffield. Three six-wheeled lorries were unable to pull it free so an 80-yd. stretch of road was dug up so that the bogie wheels could get a firm grip on the hard metal surface beneath. The road was laid two months ago but the sun had melted the tar, and the load was exceptionally heavy. The Great North Road was blocked and traffic was diverted.

THE FIRM of Multibras-Industria de Aparelhos Domesticos Ltda., Praca da Republica 497—10° andar, Sao Paulo, have announced that Whirlpool Corporation, USA, and Sears, Roebuck de Venezuela S.A., have subscribed US $1,500,000 (£500,000), in imported equipment for the expansion of the Multibras factory at Sao Bernardo do Campo, Via Anchieta Km.23. Multibras claim that by the middle of this year their factory will be one of the biggest domestic-appliance factories in Latin America. They will be producing refrigerators, washing machines, air-conditioning units, and gas ovens.

AVELING-BARFORD, LIMITED, manufacturers of road machinery, earth-moving equipment, etc., intends to make its Steeledale, Johannesburg, plant one of its main factories outside Britain. At Johannesburg, the company plans to build up an export trade with the whole of Africa. Mr. H. C. Ryan, the company's managing director, said they realized they had in the Union the skill, technical knowledge, and industrial and commercial acumen for this project of serving the greater part of Africa. No company would undertake the development plans envisaged unless it believed in the country's stability.

MR. A. G. STEWART, chairman of Stewarts and Lloyds, Limited, tube makers, said at Coatbridge, Lanarkshire, on April 24 that the company was not so busy as it might be. However, since the war tube capacity in Scotland had been doubled and it was now 280,000 tons. Orders were being sought in many parts of the world, and recently one had been secured from Eastern Europe. Mr. Stewart was presenting gold watches to 80 workers who had completed 30 years with the firm. Since the scheme was started in 1953, he said, 1,648 gold watches had been presented to Scottish employees and more than 8,000 to employees in the whole group.

AT THE BILSTON WORKS of Joseph Sankey & Sons, Limited, production is well advanced on one of the world's largest magnets needed for nuclear-research work. The magnet described as "a unique engineering feat" will be the largest in the Commonwealth and the biggest in Europe outside Russia. It is a 7,000-ton mass of steel with an accuracy to 0.0002-in. It is to form part of Britain's 7,000,000,000-ev. proton synchroton for the National Institute of Research in Nuclear Science at Harwell. Members of the Institute are to visit the Manor Works of Sankeys at Bilston on May 7, the first anniversary of the grant of its royal charter, to see work on the magnet sectors.

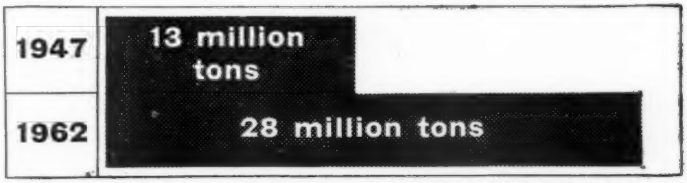
THE SHEFFIELD SOCIETY of Engineers and Metallurgists held their biennial dinner at the Royal Victoria Hotel, Sheffield, on April 24. Among those present were Mr. Harry Bull, president of the society; Mr. R. S. Fearnehough, president of the Sheffield Chamber of Commerce; Professor R. W. K. Honeycombe, chairman of the Sheffield section of the Institute of Metals; Mr. F. Cousans, president of the Sheffield branch of the Institute of British Foundrymen; Dr. J. M. Whittaker, vice-chancellor of Sheffield University; Professor A. G. Quarrell, president of the Sheffield Metallurgical Association; Mr. J. Hugh Neill, Master Cutler, and Mr. Gerard F. Young, pro-Chancellor of Sheffield University.

NEGOTIATIONS ARE PROCEEDING between Colvilles, Limited, and Charles Roberts & Company, Limited, Wakefield, Yorks, for the purchase of the Motherwell wagon works of Hurst, Nelson & Company, Limited. Charles Roberts acquired the company last year, when 600 men were employed. The labour force has since been reduced to 300 and recently it was announced that the factory would close in July. A representative of Colvilles agreed that discussions had taken place, but said that the purchase had not been completed. If negotiations are successful, Colvilles hope to make good use of the factory, though the effect on employment would not be immediate. The factory is near Colvilles' works at Motherwell.

£1,000,000,000

A thousand million pounds.
That's what the companies
in the Steel Industry are
spending on new plant.
Result for Britain–cheap steel,
plentiful steel, from one of
the most efficient steel
industries in the world.

FIFTEEN YEARS OF PLANNED EXPANSION:



Issued by the British Iron & Steel Federation

Raw Material Markets

Iron and Steel

Plentiful supplies of raw materials are available for the foundry industry, and apart from high-quality heavy cast iron and machinery scrap, arisings of which do not fully cover demands, there is no difficulty in obtaining the required supplies to cover consumption needs and for stock.

In the foundry grades of pig-iron available supplies of all qualities continue to exceed requirements, although outputs continue below capacity levels. From most producing furnaces, in fact, excess quantities arise to add to the already existing heavy stocks and the economic difficulties of the producers. Home demands for most grades of iron are still moderate, and while some export business is being obtained, the severe competition and low prices offered by makers abroad restricts the amount of business which can be obtained.

The low-phosphorus irons maintain their comparative supremacy in demand, and appreciable tonnages continue to be taken up by the makers of high-duty castings, mainly for the motor-car industry. Although outputs from producing furnaces fluctuate, overall supplies are more than sufficient to meet demands, and in several brands there are tonnages to spare from production and stocks. Hematite producers also are short of orders, and refined iron makers could undertake a much larger flow of business. The demands for high-phosphorus irons, while continuing to show a slight improvement, are still well below the tonnages available. The engineering and speciality foundries are, in the main, fairly well employed, those connected with the motor-car trade being the most heavily engaged. From heavy engineering, as well as the machine-tool trade, demands for castings are below former levels.

The light-castings trade continues to work much below capacity. Those units supplying castings to the domestic equipment trade, however, maintain their recent improved business. For builders' castings there is little improvement, and the foundries supplying mainly to that trade are very short of work.

For small bars and light sections demand is still sluggish and the re-rollers, particularly those in the English Midlands, are unable to show any appreciable improvement in their outputs. Home demands are very moderate, and export business is practically non-existent apart from special quality steels. Makers abroad continue to quote prices which are several pounds lower than UK figures. The call for steel semis is spasmodic. Only those tonnages required for immediate use are being specified, and these are much below the potential production of home steelworks.

Non-ferrous Metals

Copper is only fairly steady in London, but, in New York, demand is good, even strong at times, and the price structure is holding firm again after last week's shake-up. One of the chief contributions to the quick re-establishment of the market has been the statement from Washington that no sales of copper from the US stockpile will be ordered by the Government at present. The background to this situation is that political circles in Washington believe that any move to dispose of copper from the stockpile at the present time could be construed as an unfriendly act as international negotiations on lead and zinc were immediate. There was also the point made that the US Senate adopted a resolution on April 17 last declaring that a release from the stockpile would do incalculable damage to the national security and economic wellbeing of the United States.

The futures market is not as steady as it might be and the intake price of the custom smelters for scrap is sensitive. However, the producers are quoting 31½ cents and the custom smelters 32½ cents a pound. Stocks of refined copper in LME warehouses rose further last week and now total 10,316 tons.

Tin continues featureless, with the price still holding above £780 a ton. The stocks in LME warehouses have continued to decline each week. Last week there was a further decline and the inventory now stands at 8,733 tons. This suggests that the buffer stock manager, who is believed to own the majority of the stocks in the warehouses, has been making some effective transactions for the disposal of the metal—probably with the United States. In the US the market is quiet and the price is fairly steady around $1.02 a pound.

In lead, the surprise has been the rise in the US quotation to 11½ cents a pound. This move infused some life into the London market for a day or two, but everything seems back to normal now and lead can once more be described as flat and featureless. Zinc, too, has now reverted to its more usual form in the UK after a brief flurry in sympathy with the lead price. In the United States the price remains at 11 cents a pound.

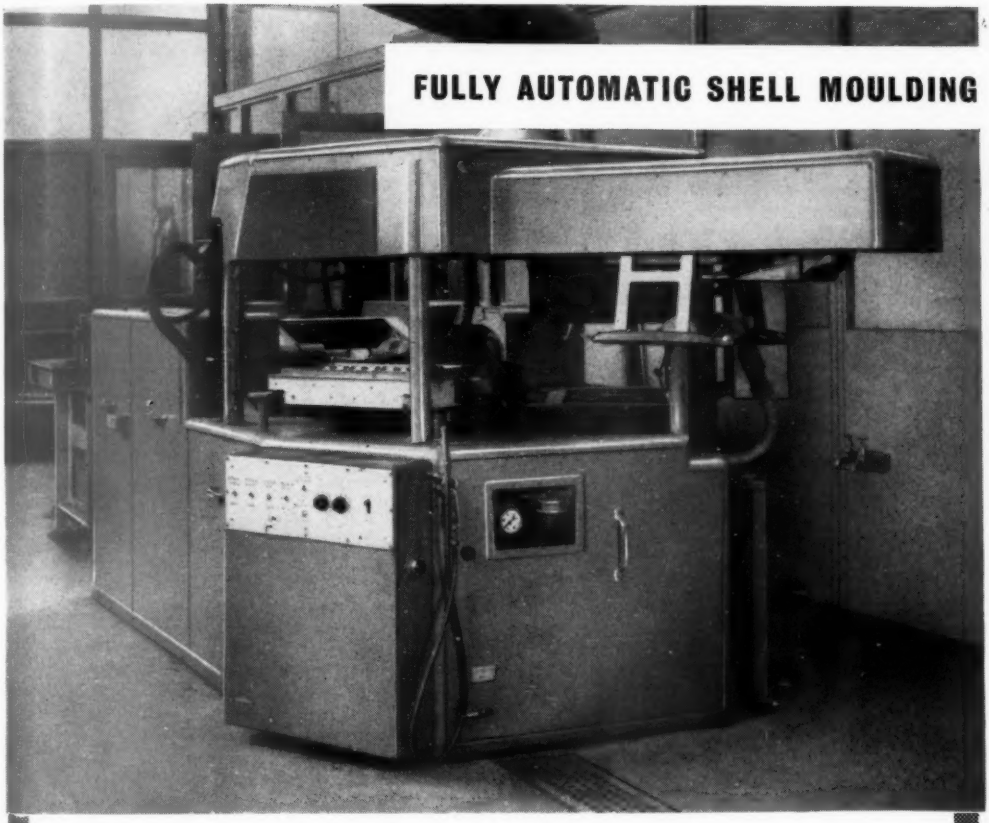
New Industries for Scotland

The Bristol Tool & Gauge Company, Limited, have arranged with Thomson Shepherd & Company, Limited, Seafield Works, Dundee, to establish a precision-engineering and toolmaking organization at the Scottish firm's Dundee works. A new company being formed will be called British Tool & Gauge (Scotland), Limited, and plant will be installed to meet high-grade press tool needs of Scottish industry. This is the third textile firm in the Dundee area to have joined forces with a precision-tool manufacturer, and the Scottish Council (Development & Industry) are working with several other Dundee firms for further arrangements in this direction.

Within the next six months the Coventry Gauge & Tool Company, Limited, will complete the transfer of Admiralty contracts from their headquarters in the Midlands to their factory in Brechin. This, and improvements in the machine-tool market following the Budget proposals, are expected to provide another 200 jobs at the Brechin plant in the next two years. The Brechin factory's labour force returned to working a five-day week last week after two months on a four-day basis.

ON APRIL 18, Yorkshire Engineering Supplies, Limited, celebrated its golden jubilee, when the directors entertained the staff and foremen to a dinner.

THE CONTINUAL BUILD-UP OF STOCKS of hard coke was causing concern to the East and West Ridings Regional Board for Industry, said the chairman, Mr. B. Hazel, at their meeting in Leeds on April 21. He said they intended to ask the Ministry of Power how experiments aimed at softening the coke and very small coal so as to make it suitable for domestic use were progressing. It was also reported at the meeting that there was a decrease of 1,895 in temporarily-stopped workers in the period February 9 to March 9. This was said to be due to less short-time working in the engineering, textiles, and iron and steel industries.



FULLY AUTOMATIC SHELL MOULDING

Production rate 75 shells per hour

The new Baker Perkins Shell Moulding Machine is fully automatic in its operation. The sand/resin mixture supplied to the storage hopper is automatically fed to the machine. The finished shells are automatically removed from the ejection station, and from there if required to a suitable conveyor.

Short runs are entirely practicable, pattern changing being simple and quick, taking only five minutes and effected single-handed.

On production, shells 18" x 12" weighing 4 to 4½ lbs. are produced at the rate of 75 per hour maximum.

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For further details, please write to:

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Telephone JARROW 89111

BP/F5

Current Prices of Iron, Steel, and Non-ferrous Metals

(*Delivered unless otherwise stated*)

April 29, 1959

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £23 17s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £24 1s. 3d.

Scotch Iron.—No. 3 foundry, £25 3s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 19s. 0d.; South Zone, £26 1s. 6d.

Refined Malleable.—P, 0.10 per cent. MAX.: North Zone, £27 6s. 6d.; South Zone, £27 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.: N.-E. of England (local iron), £25 6s. 6d.; Scotland (Scotch iron), Zone S.1, £25 13s. 0d.; Sheffield, £26 15s. 0d.; Birmingham, £27 4s. 0d.; Wales (Welsh iron), £25 6s. 6d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 0s. 0d. to £43 10s. 0d., scale 15s. 0d. per unit; 75 per cent. Si, £56 10s. 0d. to £60 10s. 0d., scale 15s. 0d. to 16s. 0d. per unit.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 7s. 11d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 10s. 11d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/72 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (home).—78 per cent., £69 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., £32 15s. 6d.; tested, 0.08 to 0.33 per cent. C, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), £34 17s. 0d.; silico-manganese, £43 16s. 6d.; free-cutting, £36 14s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

* Average 68-70 per cent.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft up to 0.33 per cent. C, £38 10s. 0d.; basic hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £40 0s. 6d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, £39 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £44 16s. 0d.; black sheets (hand mill), 24g., £58 14s. 6d.; galvanized corrugated sheets, 24g., £67 10s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 11s. 0d.; nickel-chrome-molybdenum, £111 19s. 0d.

NON-FERROUS METALS

Copper.—Cash, £233 5s. 0d. to £233 15s. 0d.; three months, £234 5s. 0d. to £234 15s. 0d.; settlement, £233 15s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 3½d. per lb; rods, 250s. 6d. per cwt. basis; 20 s.w.g., 285s. 6d. per cwt;

Tin.—Cash, £783 0s. 0d. to £783 10s. 0d.; three months, £783 10s. 0d. to £784 10s. 0d.; settlement, £783 10s. 0d.

Lead (Refined Pig).—Second half April, £70 0s. 0d. to £70 5s. 0d.; second half July, £71 2s. 6d. to £71 5s. 0d.

Zinc.—Second half April, £73 17s. 6d. to £74 0s. 0d.; second half July, £73 15s. 0d. to £73 17s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £110 5s. 0d.; rolled zinc (boiler plates), all English destinations, £108 0s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £92 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10½d. per lb.; sheets to 10 w.g., 197s. 3d. per cwt.; wire, 2s. 7¾d.; rolled metal, 197s. 3d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £156; B6 (85/15), £200.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £188; HTB2 (38 tons), £204; HTB3 (48 tons), £208.

Gunmetal.—BS1400, LG2 (85/5/5/5), £194; LG3 (86/7/5/2) £205; G1 (88/10/2/½), £256; (88/10/2/1), £240.

Phosphor Bronze.—BS1400, PB1 (AID released), £286 per ton.

Leaded Phosphor Bronze.—BS1400, LPB1 (1060), £213 per ton.

Phosphor Bronze Strip, etc.—Strip, 290s. 6d. per cwt.; wire, 4s. 1d. per lb.; rods, 3s. 4d.; tubes, 3s. 4d.; chill cast bars: solids 3s. 3½d.; cored 3s. 4½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3-in. to 9 in. wide × 0.056, 3s. 9¾d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 2¾d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 1¾d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £79 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £232; AB2, £237.

Increases in Capital

ELGAR MACHINE TOOL COMPANY, LIMITED, London, W.3, increased by £30,000, in £1 ordinary shares, beyond the registered capital of £20,000.

MELBOURNE ENGINEERING COMPANY, LIMITED, Melbourne (Derbyshire), increased by £50,000, in £1 shares, beyond the registered capital of £50,000.

ROEVAC AIR EXTRACTORS (1952), LIMITED, Denton (Lancs), increased by £13,000, in £1 ordinary shares, beyond the registered capital of £12,000.

HOLBROOK MACHINE TOOL COMPANY, LIMITED, London, E.15, increased by £750, in 1s. ordinary shares, beyond the registered capital of £150,000.

DIDSBURY ENGINEERING COMPANY, LIMITED, Manchester, increased by £20,000, in £1 ordinary shares, beyond the registered capital of £5,000.

A. N. WRIGHT & COMPANY, LIMITED, engineers, etc., of Colchester, increased by £50,000, in £1 shares, beyond the registered capital of £10,000.

ENFIELD TOOL MANUFACTURING COMPANY, LIMITED, Ponders End (Middx), increased by £90,000, in £1 ordinary shares, beyond the registered capital of £10,000.

CUNDEYS, LIMITED, general engineers, etc., of Alfreton (Derbyshire), increased by £3,000, in £1 ordinary shares, beyond the registered capital of £10,000.

WRENTHAM ENGINEERING COMPANY, LIMITED, Wrentham, Beccles (Suffolk), increased by £29,000, in £1 ordinary shares, beyond the registered capital of £10,000.

A. BROWNE & SON (SHEET METAL MANUFACTURERS), LIMITED, London, N.W.10, increased by £20,000, in £1 ordinary shares, beyond the registered capital of £10,000.

MCCALL & COMPANY (SHEFFIELD), LIMITED, steel merchants, etc., of Sheffield, increased by £150,000, in £1 ordinary shares, beyond the registered capital of £102,500.

TIMBMET, LIMITED, machinery, metal, and timber merchants, etc., of London, W.1, increased by £15,000, in £1 ordinary shares, beyond the registered capital of £25,000.

BRITISH TIMKEN, LIMITED, manufacturers of roller bearings, etc., of Birmingham, increased by £1,000,000, in £1 ordinary shares, beyond the registered capital of £5,000,000.

BOUCHER & COMPANY, LIMITED, textile and agricultural machinery manufacturers, etc., of Kidderminster, increased by £30,000, in £1 ordinary shares, beyond the registered capital of £30,000.

KEITH BLACKMAN, LIMITED, manufacturers of fans, gas heating apparatus, etc., of London, N.17, increased by £300,000, in £1 7 per cent. cumulative second preference shares, beyond the registered capital of £300,000.

Changes of Name

Among companies which have recently changed their names are those listed below. The new titles are given in parentheses.

FERRYBRIDGE INDUSTRIES, LIMITED, 44, Hertford Street, London, W.1 (Pollard Ball & Roller Bearing Company, Limited).

PLATE WORKING MACHINERY LICENCEES, LIMITED, 415, Oxford Street, London, W.1 (Plate Working Machinery Licensees, Limited).

FOSRO ENGINEERING COMPANY, LIMITED, 24, Holborn Viaduct, London, E.C.1 (Precision Engineering & Machining Company, Limited).

BARKER & WEBSTER (ENGINEERS), LIMITED, Bond Street, Hangingroyd, Hebden Bridge, Yorks (A. & H. Barker, Limited).

N.T.M. ENGINEERING COMPANY, LIMITED, Gulson Works, Gulson Road, Coventry (Gulson Engineering (Sales) Company, Limited).

BADGER-MAN, LIMITED, petroleum distillation plant manufacturers, etc., of 125/130, Strand, London, W.C.2 (Badger, Limited).

C. R. C. ENGINEERS, LIMITED, Sonorus Works, Deansbrook Road, Edgware, Middx (Boosey & Hawkes Engineers, Limited).

M. E. O., LIMITED, metals, machinery, etc., of Glasshouse Street, St. Peter's, Newcastle-upon-Tyne (Rotolift Manufacturing Company, Limited).

SAMUEL GRATRIX, LIMITED, manufacturers of sheet lead, lead pipe, etc., of 23, Quay Street, Manchester 3 (Alport House (Manchester), Limited).

C. & E. HAMILTON (ENGINEERING PRODUCTS), LIMITED, 31, Buckingham Palace Road, London, S.W.1 (Hamilton Machinery Sales, Limited).

ALBERT MANN'S ENGINEERING COMPANY, LIMITED, Cranes Farm Road, Basildon Industrial Estate, Basildon, Essex (Albert Mann Engineering Company, Limited).

LOW PHOSPHORUS
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PIG-IRON

WILLIAM JACKS & CO. LTD.
LONDON, E.C.2.
Winchester House, Old Broad Street
London Wall 4774 (6 lines)

FERRO SILICON 12/14%
ALLOYS & BRIQUETTES
N.F. METALS & ALLOYS
LIMESTONE
GANISTER
MOULDING SAND
REFRACTORIES

And at:—

BIRMINGHAM, 2. 39, Corporation St., Midland 3375/6
LIVERPOOL, 2. 13, Rumford St., Central 1558
GLASGOW, C.2. 93, Hope Street, Central 9969

Small Advertisements in this section of the Journal are accepted at the prepaid rate of 15 words for 7/6d. (minimum charge) and 4d. per word thereafter. Box number advertisements 2/6d. extra. (Situations Wanted 2d. per word throughout.) Instructions with remittance must be received not later than first post on Monday for inclusion in Thursday's issue, addressed to the Advertisement Manager, "Foundry Trade Journal," John Adam House, 17/19 John Adam Street, London, W.C.2.

SITUATIONS WANTED

KOLLENGUSS (German) Process (Brass Gravity, Die Casting). Advertiser with expert knowledge this process from scratch wishes contact firms interested. Box KP619, FOUNDRY TRADE JOURNAL.

STEEL FOUNDRY REPRESENTATIVE, resident Birmingham, experienced carbon and alloy steel castings, extensive connection in Midlands & Southern half England, desires change, offer invited from reputable foundry company. Box SF533, FOUNDRY TRADE JOURNAL.

REPRESENTATIVE hitherto handling quality steel, iron, alloy castings, London and Home Counties, seeks similar representation. Salary/commission/expenses alternatively commission/expenses basis. Box RH615, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

METALLURGICAL CHEMIST required in West Wales. Experience in non-ferrous essential. Submit age, details experience and salary required to Box MC627, FOUNDRY TRADE JOURNAL.

EXPANDING pressure and gravity light alloy diecasters South London area require a live and fully experienced ASSISTANT to WORKS MANAGER. Ample scope for promotion. Knowledge of production control and costing an asset. State full details experience, in confidence and salary expected. Box EP624, FOUNDRY TRADE JOURNAL.

REQUIRED. IRONFOUNDRY OR STEEL REFRACTORY METALLURGIST with drive and initiative. Direct personal sales and representatives. West Riding. North of England resident. Foundry steel work, sands, plastic and rammed linings. Excellent working conditions, progressive post. State educational, technical and commercial experience, if any, terms required, when available. All applications without exception treated in strictest confidence. Box RI620, FOUNDRY TRADE JOURNAL.

STEEL FOUNDRY SUPERINTENDENT required for Australia for Electric Steel Foundry producing castings, both machine and jobbing up to 12 tons weight. The position calls for a Journeyman Moulder with higher qualifications, able to handle men and organise production and only top level persons should apply. Applicants will be interviewed in the United Kingdom. Accommodation is available in modern house. Applications in writing giving fullest personal particulars, industrial experience and references, which will be treated with confidence to: Box SF621, FOUNDRY TRADE JOURNAL.

IRON FOUNDRY, near NOTTINGHAM, require the services of a METALLURGICAL CHEMIST to take charge of Laboratory carrying out routine analyses of cast iron. Contributory pension scheme. State full particulars of experience, age, salary.—Box IF637, FOUNDRY TRADE JOURNAL.

GRAVITY DIE FOUNDRY FOREMAN required. Staff position, Pension Scheme and good canteen facilities. Apply: THE GENERAL MANAGER, THE PREMIER ALUMINIUM CASTING CO., LTD., Beehive Works, Old Birchills, Walsall, Staffs.

SITUATIONS VACANT—*contd.*

FOREMAN for grey-ironfoundry required. Must possess wide experience and be capable of estimating and working from drawings, controlling cupolas, and producing good quality castings for general jobbing engineering, machine tool and a variety of trades from loose patterns, plate, and moulding machines, and generally organizing moulding and labour personnel.—Give full details of experience, age and salary required. Box FF639, FOUNDRY TRADE JOURNAL.

SALES ENGINEER. Required by Abrasive Wheel Manufacturer of international repute in the Midland area. Knowledge of grinding operations in foundries, drop forge, welded steel fabrication and allied trades desirable. Aged 30-35. Excellent prospects, Pension and Bonus Schemes in operation. All replies will be treated in confidence. Box SE618, FOUNDRY TRADE JOURNAL.

GENERAL MANAGER

required for

IRON AND BRASS FOUNDRIES

also

COPPER SHOP

APPLICATIONS are invited for the position of GENERAL MANAGER for the established Heavy and Light Iron Foundry, Medium and Light Brass Foundry and Copper Shop engaged in all aspects of coil production and flat sheet and tube work.

Applicants should have knowledge and experience of not less than one section of the organisation and be fully qualified to conduct, supervise and expand the business. Age 35 to 40 years. Please state fully, qualifications, all past experience and salary required. Write 2242, WM. PORTEOUS & Co., Glasgow.

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Borough Road, S.E.1.

Principal: JAMES E. GARSIDE, M.SC.TECH., PH.D., F.R.I.C., F.I.M., M.INST.F.

DEPARTMENT OF MECHANICAL ENGINEERING

Head of Department: G. L. H. BIRD, B.SC. (ENG.), M.I.MECH.E., M.INST.R.

APPLICATIONS are invited for the post of ASSISTANT LECTURER (Grade B) in FOUNDRY TECHNOLOGY. Candidates should have a wide industrial experience with appropriate qualifications, and preferably be Members of the Institute of British Foundrymen.

Duties will include teaching foundry technology and practice and allied subjects in courses leading to the City and Guilds final examinations in Foundry Practice, and to teach Foundry Technology to advanced Mechanical Engineering courses.

The Department is well equipped with a cupola, indirect arc, high frequency and gas-fired crucible furnaces, together with heat-treatment, metallography and sand testing equipment.

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Further particulars and Form of Application obtainable from the undersigned.

FREDK. J. PACKER,
Clerk to the Governing Body.

SITUATIONS VACANT—*contd.*

FOUNDRY MANAGER

is required by an Established Foundry in the Midlands.

THE SELECTED APPLICANT will be directly responsible to the DIRECTOR; for production of high quality Alloyed and Grey Iron Castings; Development of Methods; Layout of Plant and Control of a sizeable Labour Force.

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WANTED. Two Cupolas. Melting rate 4 to 5 tons per hour, complete with Spark Arrestors (either wet or dry type) and Skip Hoist charging. Details to OUZLEDALE FOUNDRY CO. LTD., Long Ing, Barnoldswick.

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